Shasta and Scott River Pilot Program for Coho Salmon Recovery: with recommendations relating to Agriculture and Agricultural Water Use

Prepared for
The California Department of Fish & Game

by

The Shasta-Scott Coho Salmon Recovery Team

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Cover photo: Scott River. Courtesy of Craig Martz, California Department of Fish and Game.

The Shasta-Scott Recovery Team, 2003

EXECUTIVE SUMMARY

Introduction

Following California Fish and Game Commission hearings in late summer 2002 regarding the coho salmon listing process, the California Department of Fish and Game (Department) designated the Shasta and Scott River valleys as a separate component in the statewide recovery of coho salmon. The Department formed the Shasta-Scott Coho Recovery Team (SSRT) to build on the efforts of landowners in both valleys to improve fish habitat. The local recovery team is comprised of membership from a broad range of relevant interests.

The SSRT met between January and July, 2003 to develop recommendations, focused on agriculture and agricultural water use, for recovering coho salmon habitat and populations in the Shasta and Scott valleys. The team's intent was to aid the Department in the development of a range-wide recovery strategy for coho, and develop a demonstration project for future recovery strategies for other threatened or endangered species. While the SSRT's effort to develop the recommendations was largely independent of the California Statewide Recovery Team's (CRT) effort, coordination of the two teams occurred throughout the recovery planning process. The SSRT also welcomed and encouraged public input on the recommendations by providing opportunities for public comment at each recovery team meeting and hosting a town hall meeting in both valleys.

The Shasta Valley and Scott River Hydrologic Areas

The Shasta and Scott River valleys are situated in central Siskiyou County. The Shasta River and Scott River are tributaries to the Klamath River, with confluences to the Klamath occurring 143 and 177 river miles upstream from the Pacific Ocean. Our understanding of the status of coho salmon in the Shasta and Scott rivers is limited by a lack of historic and current information, though existing data sources have provided some information about the number of coho that return to spawn, the migration patterns and behavior of coho in these rivers, and the availability and utilization of habitat by coho. Known problematic issues for coho in the Shasta and Scott rivers include degradation and loss of spawning and rearing habitat, barriers to passage, high water temperatures, turbidity, agricultural diversions, and low instream flows. In both valleys, irrigated agriculture has been the primary land use since the 1850s, and most rights to divert water have been adjudicated.

Recommended Actions for Coho Salmon Recovery

The SSRT developed recommendations based on the best available scientific information and on local knowledge, customs, and experiences with habitat restoration. The SSRT has discussed each recommendation and reached preliminary consensus that each represents a viable solution to the issues for coho salmon. The recommendations address a range of issues within the following seven categories: Water Management, Water Augmentation, Habitat Management, Water Use Efficiency, Protection, Assessment and Monitoring, and Education and Outreach. With each recommendation, the SSRT has included the priority and timing for implementation, status of current activities, lead entities, short-term and long-term actions, and approximate costs for implementation. Before finalizing the recommendations, the SSRT intends to consider them in another round of review and to establish the framework for an implementation and permitting strategy.

Implementation of Recommended Actions

The SSRT recognizes that the successful implementation of the recommendations is inextricably linked to the development of an integrated State and Federal permitting process for specific activities in the two valleys. The framework should provide greater certainty about environmental requirements for ranchers and farmers, and improved efficiency in the permitting process. California State law provides several options for permit streamlining to meet these needs. The team has reviewed the options, and it appears that the needs of the Shasta and Scott River valleys could be best met with a programmatic Streambed Alteration Agreement and Incidental Take Permit for each valley. Under this option, certain SSRT recommendations would be incorporated into the Incidental Take Permits.

The SSRT believes it is imperative to apply an approach to local coho recovery efforts that integrates design, management and monitoring to systematically test assumptions in order to learn and adapt. The recommendations have been designed and prioritized such that management of coho recovery can proceed adaptively. The Shasta-Scott Pilot Program will include implementing a comprehensive monitoring plan to assess the effectiveness of individual recovery actions using benchmarks for evaluating success.

The SSRT remains committed to working with the Department, other State and Federal agencies, and various interest groups to implement the Shasta-Scott Pilot Program in an economically reasonable manner with an equitable apportionment of public and private obligations. The SSRT recognizes that compliance with existing regulations will be an essential component of the Pilot Program. Additionally, the team continues to believe that an incentive-based approach to implementation is the most viable option for agricultural areas of the Shasta and Scott valleys.

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I. INTRODUCTION

The Shasta and Scott river valleys are situated in central Siskiyou County, a large, sparsely populated county at the California-Oregon border. Both rivers are tributaries to the Klamath River (Figure 1).

A. The History, Formation and Mission of the Shasta and Scott Coho Recovery Team (SSRT)

Following the late summer 2002 California Fish and Game Commission (Commission) hearings concerning the listing process of coho salmon, the Department established the Scott and Shasta valleys as a separate component of the recovery strategy, focusing on agriculture and agricultural water use. The Commission and the Department recognized previous and ongoing efforts of landowners in the two valleys and anticipated further refinement of these measures and lessons learned in the application of recovery efforts in Siskiyou County as well as application in other counties.

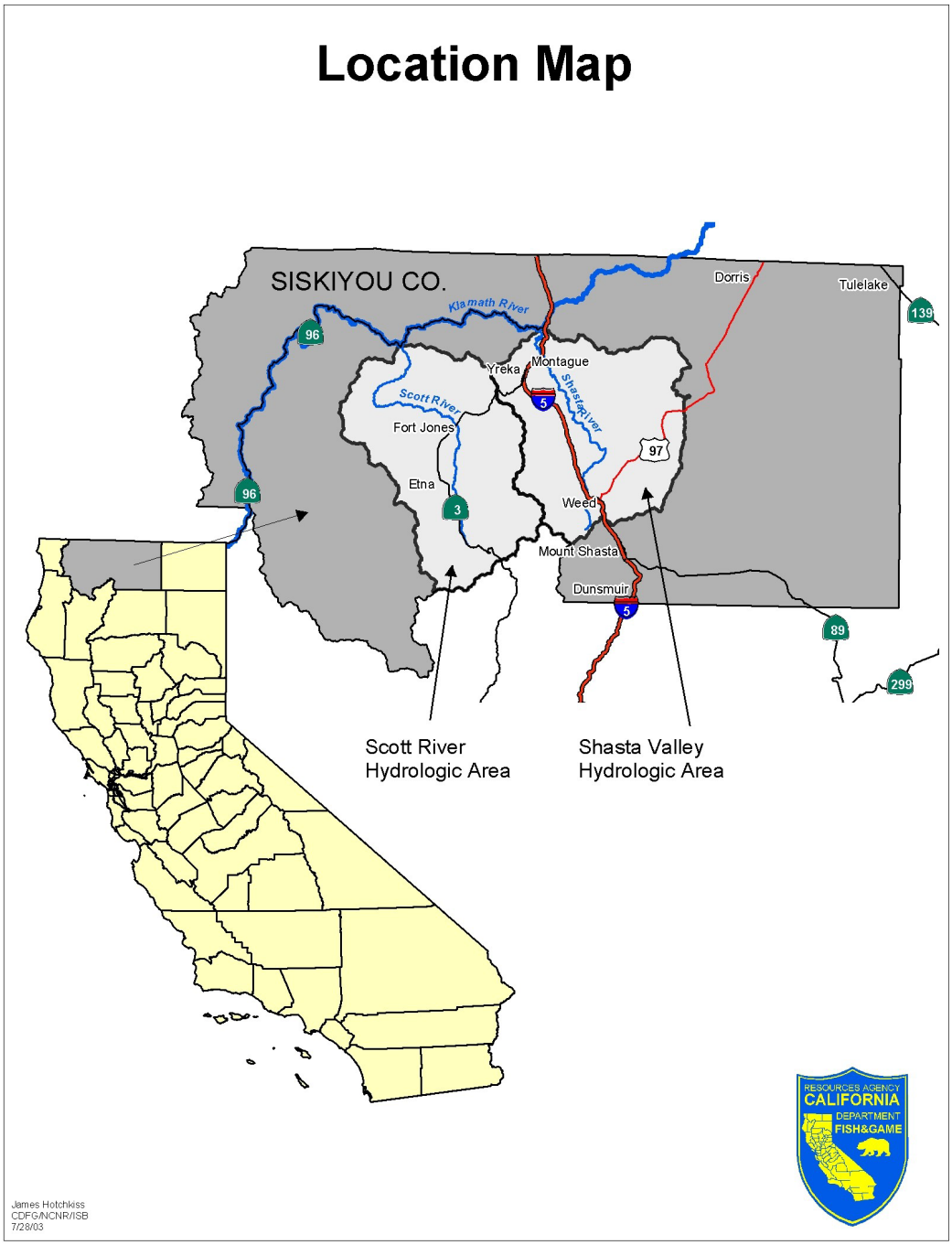
In the winter of 2002, a local recovery team was formed. The team included a balanced group involving membership from the local Save Our Shasta & Scott valleys coalition (S.O.S.S.), environmental groups (petitioners), Department of Water Resources (DWR), local Resource Conservation Districts (RCD) and Coordinated Resource Management and Planning (CRMP) groups, recreational fishing interests, the Department, National Oceanic and Atmospheric Administration (NOAA) Fisheries, U.S. Fish & Wildlife Service, Siskiyou County and a science advisor from U.C. Davis.

The Department engaged two professional meeting facilitators, Bob Barrett and Carolyn Penny, to assist the group in honoring the schedule of meetings, the ground rules, and other agreements adopted by the SSRT. The facilitators performed a vital function of guiding discussions, thereby significantly enhancing meeting productivity. The Department also employed the professional services of Sandy Guldman as technical writer and document manager to keep accurate records of the meetings and maintain recommendation revisions. Ms. Guldman's efforts also proved essential for efficient progress.

The recovery team began meeting in January of 2003 and quickly established ground rules and protocol in fulfilling their mission. A mission statement was agreed to as follows:

"Within our vision of restoring healthy, wild and naturally reproducing populations of coho salmon in the Shasta and Scott Rivers, it is our mission to provide the Department of Fish and Game with recovery recommendations focusing on agriculture and agricultural water use, based on local knowledge and scientific information regarding the biological and physical environment, local customs and preferences, as well as local experiences with habitat restoration efforts and strategies. It is our goal to aid the Department in development of a recovery strategy for coho salmon, with the eventual goal that environmental conditions in the Shasta and Scott Rivers will no longer be found to be contributing to the need for listing of coho salmon as a threatened or endangered species in California. Further, it is our intent that the recovery strategy developed by the "Scott and Shasta Rivers Pilot Program" will become a demonstration project for future recovery strategies for other threatened or endangered species in California and the nation."

Figure 1. Location of the Shasta Valley and Scott River Hydrologic Areas



Numerous longstanding agricultural practices in the Scott and Shasta watersheds have the potential to result in the take of coho salmon. Despite the longstanding nature of these activities, coho have been able to persist in the watersheds. That persistence gives the group some assurances that the comprehensive implementation of the Pilot Program within these watersheds will reliably move the coho populations toward recovery.

B. Process and Development of the Shasta-Scott Recovery Plan

The Department established the Shasta-Scott Recovery Team (SSRT) as a pilot process for planning species recovery at the watershed scale with the integral involvement of local stakeholder representatives. It was determined that the group would focus on agriculture and agricultural water use in the Shasta and Scott valleys and leave the non-agricultural issues (e.g., timber harvest and public lands management) to be addressed by the California Statewide Recovery Team (CRT).

One or two-day team meetings were held on a monthly basis to make decisions on plan components and to work through recommendations. In the interest of efficient time use at these meetings, development of information and draft recommendations was delegated to sub-committees and work groups. Through the exchange of proposals and comments by e-mail and meeting outside the regular team schedule, these small groups developed draft recommendations and other supportive or informational documents. The sub-committee or work group drafts were then transmitted to all members of the group for consideration and discussion at the upcoming team meetings.

Maintaining a flow of information to the public and seeking public input were considered to be an important component of this recovery planning process. All SSRT meetings were open to the public and members of the press were encouraged to attend. To allow for public input, 15 to 20 minutes at the start of each meeting and just before the mid-day break were built into the meeting agendas. Members of the public were allowed to address the SSRT in short statements or presentations (approximately two to five minutes) on any agenda topic.

Periodic press releases were generated, and two public meetings were held. The first public meeting, held April 16, 2003 in Yreka, was convened to present an overview of the recovery planning process and receive public comments. Prior to the second public meeting in Fort Jones in July, 2003 all of the recommendations developed by the team to date were made available to the public at local libraries, on the web, and at the county administrator's office. The purpose of this second public meeting was to present a summary of the work and receive questions and comments.

The SSRT worked through formulation and modification of a set of recommendations for coho salmon recovery within the Shasta and Scott valleys. The preferred method of team decision-making was by consensus, meaning concurrence of all of the members (or approved alternates) present. However, the decision-making ground rules agreed to by the team contain the provision that decisions can be forwarded as final provided no more than two of the team members (or their alternates) express disagreement. If consensus was not achieved, dissenting team members had the option of preparing a minority recommendation as a permanent part of the record.

The team has reached preliminary agreement, termed "preliminary favorable regard," on all of the recommendations included in the Pilot Program. The SSRT intends to consider the recommendations in another round of review and to establish the framework for an implementation and permitting strategy (Including Streambed Alteration Agreements and Incidental Take Permits) before finalizing the recommendations. The recommendations are presented in Section IV B.

C. Relationship to and Coordination with the California Statewide Recovery Team (CRT)

The CRT and Shasta-Scott Recovery Team were formed as complimentary teams to aid the Department in the development of a range-wide recovery strategy for coho in California. The charge of the CRT includes providing recommendations addressing coho recovery throughout the species' range in California, with the exception of the agricultural portions of the Shasta and Scott valleys. While the effort to develop the following SSRT recommendations was largely independent of the efforts of the CRT, coordination of the two efforts was accomplished through regular attendance of the CRT meetings by some members of the SSRT and presentation of the Shasta-Scott preliminary recommendations to the CRT. Information and concerns from the SSRT have been transmitted to the CRT through Craig Martz (SSRT leader from the Department), Greg Bryant (SSRT- NOAA Fisheries representative and alternate for CRT), and Bill Bennett (SSRT- DWR representative). Preliminary recommendations were presented to the statewide recovery team CRT on May 29, 2003. Representatives from the SSRT noted the comments and brought them to the full team. The comments were considered and appropriate revisions were made in response.

II. SHASTA VALLEY HYDROLOGIC AREA (HA)

A. Overview

Because of its geology, vegetation and climate, the Shasta River Watershed is considered part of the Great Basin, with conditions similar to those typical of Eastern Washington, Eastern Oregon, Northern Nevada, and those parts of California east of the Sierra Nevada.

The Shasta River Watershed consists of approximately 507,500 acres (793 mi^2 or 2,058 km^2) and is classified as both a Hydrologic Area and a Hydrologic Sub-Area (HSA) under the CALWATER Version 2.2 Classification System. The Shasta River originates within the higher elevations of the Eddy Mountains lying southwest of the town of Weed in Siskiyou County, California. It flows for approximately 50 river miles (80.5 km) in a northerly direction, passing through the Shasta Valley. After leaving the valley, it enters a steep-sided canyon where it flows for a distance of seven river miles (11 km) before emptying into the Klamath River, 176.6 river miles (284 km) upstream from the Pacific Ocean. The river drains a portion of the Cascade Province to the east and a portion of the Klamath Province to the west. The Shasta River Watershed is situated entirely within Siskiyou County (Figure 2).

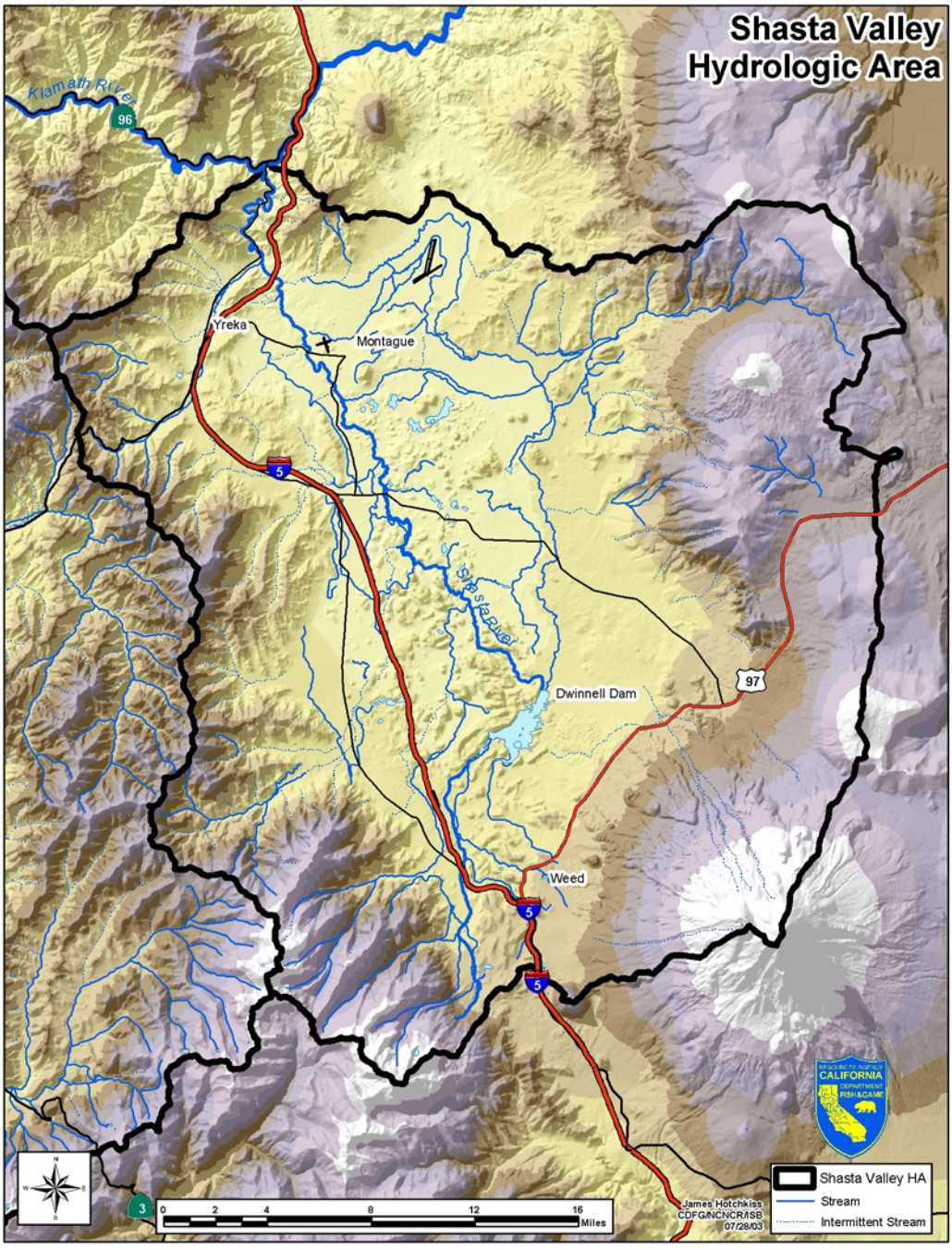
Numerous springs and a few small tributary streams enter the Shasta River as it passes through the Shasta Valley. Glacial melting from Mt. Shasta and mountain precipitation provide the principle source of recharge for the river. Major tributaries include Parks Creek, Big Springs Creek, Little Shasta River, and Yreka Creek. The highest point in the Shasta River Watershed is Mt. Shasta at just over 14,000 feet (4,267 m). Where the Shasta River enters the Klamath River, the elevation is just over 2,000 feet (615 m).

Historic human activities in the watershed that affected the condition of the fishery included mining for gold in Yreka Creek and the lower 7 miles (11.3 km) of the Shasta River beginning about 1850 and continuing through the 1930s. In addition to gold, gravel extraction occurred at areas of accumulation along the mainstem Shasta. Agricultural activities included farming for local needs (i.e. orchard crops, truck farms, grain and hay) and the production of beef for distant sales. Both agriculture and mining activities were dependent on the development of water diversion systems to meet their needs. Water diversion systems were begun in the 1850s, and largely complete by 1930. Water rights in the Shasta River were adjudicated under the Shasta River Decree (Decree #7035) in 1932. Agricultural water diversions in the Shasta Valley have been under state watermaster service by the Department of Water Resources since 1933.

B. Status of Coho Salmon in the Shasta Valley Hydrologic Area/Sub-Area

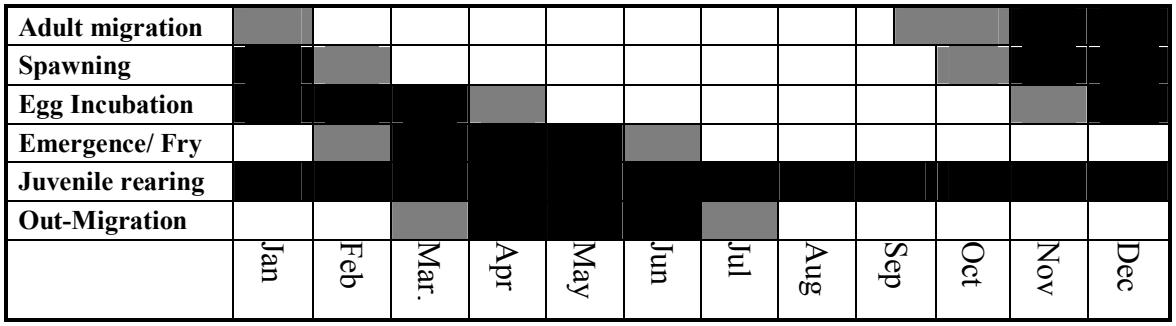
Little is known regarding the number of spawners, migration patterns and behavior of coho salmon produced in the Shasta River. However, these fish likely follow the migration patterns and emulate the behavior of coho salmon studied in other areas of the Klamath River basin and have similar spawning requirements as do steelhead within the Shasta Valley.

Figure 2. Shasta Valley Hydrologic Area



Nearly all adult coho enter the Klamath River from the ocean from mid-September through January to spawn (USFS, 1972). Egg incubation begins in November with the initiation of spawning activity and continues through March. Hatching occurs in one to three months, depending on water temperature, with fry emergence occurring from February through mid-May. Juvenile coho salmon remain in their freshwater streams for approximately one year prior to outmigrating as yearling smolts between February and mid-June. Within the Klamath River basin, peak outmigration activity occurs during April and May (Leidy & Leidy, 1984) (Figure 3).

Figure 3. Generalized life stage periodicity of coho salmon in California Coastal watersheds. Gray shading represents months when the life stage is present, black shading indicates months of peak occurrence.



Records from the Shasta River Fish Counting Facility indicate that adult coho salmon have been observed returning to the Shasta River in most years since 1934, when counts were initiated (see Tables 1 & 2). In all but a few cases, the numbers reported do not represent the entire run since field activities were typically ended due to high water before complete counts could be made. Despite this shortcoming in terms of data availability, estimates have been made of coho run sizes. Coho salmon runs in the Shasta Valley HA probably averaged a little more than 1,000 fish annually (CDFG 1959) in the late 1950s. In the early 1960s, the runs were estimated to average 600 fish (CDFG 1979). Adult coho were observed in Big Springs Creek and Yreka Creek in the 1990s.

While current counts appear low in comparison to these earlier estimates, at present little quantitative information on either habitat availability or habitat utilization for either coho spawning or rearing is available for the Shasta Valley HA.

Table 1. Counts of coho salmon observed at the Shasta River Fish Counting Facility, and dates of operation by year.

Year	Dates of operation	Adult	Grilse	Total		Year	Dates of operation	Adult	Grilse	Total
1934	8/30-12/13	677	N/D[a]	677		1968	8/25-10/29	2	0	2
1935	9/1-1/4/36	186	13	199		1969	9/5-10/30	ND	ND	ND
1936	8/1-1/31/37	387	0	387		1970	9/5-11/16	186	55	241
1937	8/25-12/2	195	ND	195		1971	9/7-10/29	69	5	74
1938	8/16-4/18	2	0	2		1972	9/10-11/13	114	50	164
1939	8/19-4/12/40	730	152	882		1973	9/4-11/14	121	35	156
1940	8/19-3/31/41	70	82	152		1974	9/3-11/1	131	31	162
1941	8/29-3/31/42	36	8	44		1975	9/2-10/29	165	31	196
1942	8/29-2/9/43	74	0	74		1976	9/3-10/29	123	1	124
1943	8/25-11/2	ND	ND	ND		1977	9/1-11/12	280	25	305
1944	8/28-11/3	15	0	15		1978	9/11-4/11/79	748	151	899
1945	8/29-11/14	29	0	29		1979	9/1-3/30/80	194	141	335
1946	8/28-11/4	7	0	7		1980	9/7-5/9/81	321	97	418
1947	9/14-1/7/48	226	43	269		1981	9/23-1/7/82	32	1	33
1948	8/30-4/14/49	285	63	348		1982	9/6-2/24/83	150	86	236
1949	9/12-1/21/50	312	ND	312		1983	9/10 to 1/13	29	7	36
1950	NO DATES	ND	ND	ND		1984	9/9 to 11/25	58	11	69
1951	8/2-10/30	160	ND	160		1985	9/6 to 12/2	3	0	3
1952	8/27-10/31	16	ND	16		1986	9/7 to 11/1	27	4	31
1953	8/31-10/30	22	ND	22		1987	9/2 to 11/2	23	1	24
1954	8/31-10/29	2	ND	2		1988	9/23 to 11/13	3	0	3
1955	8/24-11/8	0	0	0		1989	9/9 to 10/22	5	1	6
1956	NO COUNT DUE TO STORM DAMAGE					1990	9/11 to 10/29	2	0	2
1957	9/10-10/31	310	ND	310		1991	9/13 to 11/12	4	1	5
1958	NO DATES	147	ND	147		1992	9/9 to 11/12	2	1	3
1959	8/30-10/30	36	ND	36		1993	9/10 to 11/13	4	0	4
1960	8/28-10/15	12	ND	12		1994	9/22 to 11/7	15	2	17
1961	9/3-10/31	14	ND	14		1995	9/18 to 11/12	15	2	17
1962	8/28-10/26	0	0	0		1996	9/17 to 11/4	0	0	0
1963	9/4-11/1	105	ND	105		1997	9/17 to 10/28	5	1	6
1964	?-10/30	5	0	5		1998	9/17 to 11/4	0	0	0
1965	9/1-11/1	0	0	0		1999	9/17 to 11/10	ND	ND	28
1966	9/3-10/26	ND	ND	ND		2000	9/8 to 11/7	ND	ND	1
1967	9/11-10/28	ND	ND	ND		2001	9/6 to 12/14	ND	ND	291
						2002	9/19 to 12/17	86	ND	86[b]

a. Not Determined
b. Preliminary data pending final review.

Table 2. Historic (≤1995) and current coho salmon distribution in the Shasta River. The Shasta River and its tributaries are listed along with the citations documenting coho salmon occurrence. "X" indicates coho salmon presence documented.

		Brown & Moyle	Hassler et. al	Brownell et al. 1999		NCCCSI	CDFG
		1991	1991	≤1995	>1995	2001	2002
Shasta River		X	X	X	X	X	X
	Big Springs Creek	X	X	X	No data	No data	No data
	Yreka Creek	No data	No data	No data	No data	No data	X[1/]
	Parks Creek	No data	No data	No data	No data	No data	No data
	Little Shasta R.	No data	No data	No data	No data	No data	No data

[1/] CDFG unpublished data.

C. Issues for Coho Salmon in the Shasta Valley Hydrologic Area/Sub-Area

Issues for coho salmon in the Shasta Valley Hydrologic Area, including opportunities for recovery actions, were compiled from a variety of sources (CH2M HILL 1985, KRBFTF 1991, Wood and Rogers 1991, Jong 1995, CDFG 1997, Shasta CRMP 1997) and are presented in Table 3. The table summarizes issues by category and opportunity for remediation.

Table 3. Issues and opportunities for recovering coho salmon in the Shasta Valley HA/HSA.

	Issues for Coho Salmon in the Shasta River	Agricultural issue	Non-Ag. Issue	Naturally occurring problem in part	historic activity no longer occurring	Remedial steps begun	Funding needed for identified studies
Flow							
	Reduced summer flows due to climate, diversion, development.	XX	x	x		x	
	Loss of channel maintenance flows	XX	x				x
	Groundwater use depleting surface flows	XX	XX				x
	Fish access limitations	XX	x			x	
H2O Quality							
	High water temperatures	XX		XX		x	
	Low levels of dissolved oxygen	XX	x			x	x
	Elevated nutrient levels	XX	x	x		x	x
	Turbidity	XX	XX				
Habitat							
	Limitation on spawning gravel quantity		XX	XX	XX	x	x
	Loss of spawning gravel quality	XX	XX			x	x
	Microhabitat limitations-lack of depth, suitable substrate, cover, holding habitat, etc	XX		x	x		x
	Loss of riparian habitat (trees)	XX	x	XX		x	x
	Minor barriers to passage	XX	x			x	x
	Major barriers to passage (Dwinnell & Greenhorn dams)	XX	XX				
Protection							
	Unscreened diversions	XX				x	
	Legal and illegal harvest & predation		XX	x		x	
Other							
	Lack of funding for planning and studies necessary to precede restoration or fill data gaps		XX			x	x
	Lack of on-the-ground access for studies	XX	x			x	
	Urban impacts		XX			x	
	Dangerously low population numbers for recovery of sustained population	x	x	x		x	
	Key: XX =primary opportunity for improvements; x=secondary opportunity for improvements						

III. SCOTT RIVER HYDROLOGIC AREA

A. Overview

The Scott River is one of four major tributaries of the Klamath River. It enters the Klamath at River Mile 143 at an elevation of 1,580 feet (482.6 m). The Scott River Hydrologic Area is comprised of the Scott Valley and Scott Bar Hydrologic Sub-Areas. Substantial variation in geology, geomorphology, and climate exist within the HA. Agricultural water use is an important factor only in the Scott Valley HSA.

The Scott River watershed drains approximately 520,617 acres (812.2 mi^2 or 2,107 km^2). Major tributaries to the 58 mile (93.3 km) long Scott River are Shackleford/Mill, Kidder, Etna, French, and Moffett Creeks and the South and East Forks Scott River. Native vegetation consists of mixed-conifer forest on the western mountain slopes, with scattered meadows and brush, while the eastern mountains are covered by extensive areas of brush, oak, western juniper, and annual grass. The Scott River is part of the Klamath Mountain Province, which encompasses land in both Southern Oregon and Northern California (Figure 4).

The Scott River is located in Siskiyou County in a sparsely populated area of northern California. Total population within the Scott sub-basin in 2000 was estimated at 5,000 centered in the cities of Fort Jones and Etna as well as the rural communities of Greenview, Callahan, and Scott Bar. Local economy is based on farming, ranching, timber harvesting, small businesses, and some tourism. Water rights within the Scott Valley HSA are apportioned under the terms of the Scott River Adjudication (Decree No. 30662, 1980). Water has been allocated for irrigation, stock-water and domestic use from the Shackleford/Mill Creek drainage under a 1950 adjudication decree (Decree #13775) and from the French Creek drainage under a 1958 adjudication decree (Decree #14478). Additionally, agricultural water diversions in Shackleford/Mill, Wildcat, and French/Miner Creeks have been under watermaster service by the Department of Water Resources since 1950, 1981, and 1969, respectively.

B. Status of Coho Salmon in the Scott River Hydrologic Area

The Scott River sub-basin probably holds the largest number of native coho of the larger Klamath River tributaries (Brown et. al. 1994). However, only very limited information exists on numbers of returning spawners. The Department of Water Resources (1965) estimated the Scott River's fish populations to be 10,000 Chinook salmon, 2,000 coho salmon and 20,000-40,000 steelhead trout. The Department of Fish and Game (1965) estimated that during the early 1960's, the Scott River's fish populations were 8,000 Chinook salmon, 800 coho salmon, and 5,000 steelhead.

Between 1982 and 1991, the Department operated a weir in the Scott River near the mouth. Although the primary purpose of the weir was to facilitate development of fall Chinook escapement estimates, early returning coho were counted while the weir was operating. This period is earlier than the primary upstream migration & spawning period for coho in the Scott River, which tends to run from late November through January (Maurer 2002).

Figure 4. Scott River Hydrologic Area

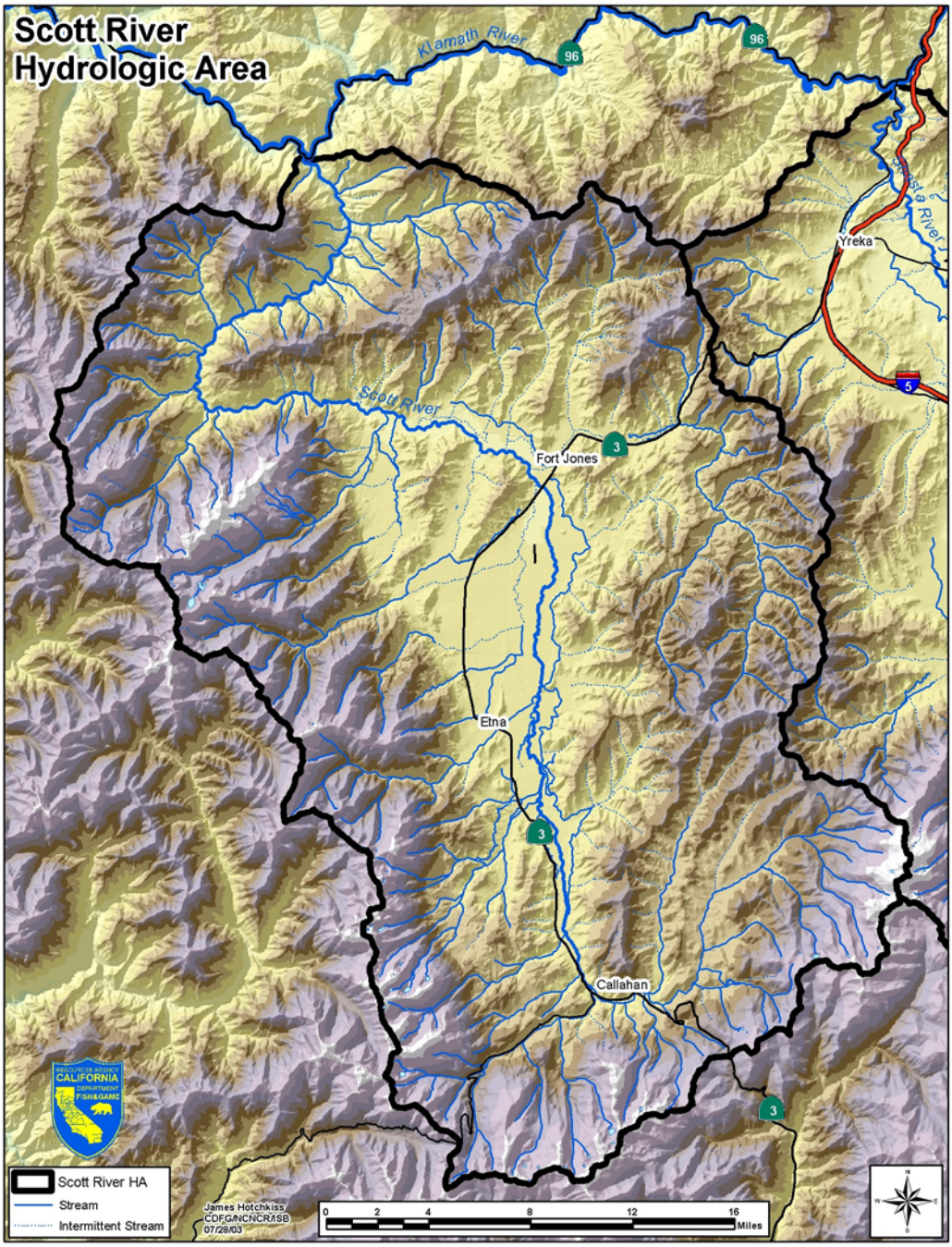


Table 4. Year, dates of operation and counts of coho salmon observed at the Scott River weir operated by CDFG[1/]

Year	Dates of Operation	Grilse	Adults	Total[2/]
1982	9/14 to 10/29	0	5	5
1983	9/14 to 11/3	1	21	22
1984	9/10 to 10/31	12	38	50
1985	9/3 to 11/12	0	1	1
1986	9/11 to 11/19	18	49	67
1987	9/25 to 11/18	12	248	260
1988	9/24 to 11/9	No coho reported		
1989	9/8 to 10/22	1	7	8
1990	9/8 to 10/28	1	6	7
1991	9/10 to 11/5	0	3	3

1/ CDFG unpublished data. Yreka, CA.
2/ Total numbers of coho observed should not be construed as escapement values as the weir was removed prior to peak of the coho run.

Between May 2, 1970 and February 28, 1971, Lanse (1971) estimated that a total of 111 juvenile and zero adult coho salmon were harvested by anglers in a study of the mainstem Scott River from its mouth to the town of Callahan. He estimated anglers spent over 17,000 hours fishing and also harvested 682 adult and 176 half-pound steelhead and 14 adult and 37 juvenile Chinook salmon.

C. Status of Coho Salmon in the Scott Valley HSA

During cooperative coho spawning ground surveys, from December 2001 through January 2002, adult coho spawners (live or carcass) and redds were inventoried for the first time ever for the Scott River system (Maurer 2002) (Note: This survey began after the run had moved upstream in late November and only included stream reaches with public access or private landowner approval). In Mill Creek near the town of Scott Bar, one coho salmon redd was observed in December 2001. Adult spawners were also observed during the 2001-2002 season in: South Fork Scott River (64 fish), Etna Creek (2 fish), Sugar Creek (42 fish), French Creek (16 fish), East Fork Scott River (30 fish), Miners Creek (8 fish), Shackleford Creek and its tributary Mill Creek (9 fish), and Patterson Creek (1 fish). All totaled, 173 live coho salmon and 212 coho redds were observed during the 2001-2002 surveys (Maurer 2002). During the adult coho survey, 26% of the estimated habitat was surveyed at least once, but only 6.5% was surveyed more then once (Maurer 2002). While survey conditions were more difficult during the 2002-2003 season, only 19 adult coho salmon were observed for the 2002-2003 season (Draft Scott River Watershed Adult Coho Salmon Coho Spawning Survey. December 2002- January 2003).

Juvenile coho have been annually rescued by Department personnel from Scott River tributaries as flows diminish in late spring and early summer due to natural conditions and water use in the basin. Fish become trapped in side channels and pools which expose them to predation and elevated water temperatures. While rescue efforts have been underway for many years, counts of rescued fish by species were not kept until about the mid-1990's. Some of the streams in which rescue operations have occurred are Shackleford Creek and its tributary Mill Creek, Etna Creek, French Creek, Patterson Creek, Kidder Creek and Mill Creek (near Scott Bar) (Dennis Maria pers. comm. 2002a). In surveys conducted since 1996, coho salmon were not observed in one

historical coho bearing stream: Tompkins Creek. Since the initiation of the Department's downstream migrant trapping operations in 2000, juvenile coho have been captured each year in the mainstem Scott River.

Table 5. Historic (≤1995) and current coho salmon distribution in the Scott Valley HSA. 3rd order tributaries to the Scott River are listed along with the citations documenting coho salmon occurrence. "X" indicates coho salmon presence documented, "A" indicates coho salmon not present during surveys and "U" indicates that coho salmon were undetected during surveys.

Scott Valley HSA						
	Brown & Moyle	Hassler et. al	Brownell et. Al 1999		NCCCSI	CDFG
	1991	1991	≤1995	>1995	2001	2002
Shackleford Creek	X	X	X	X	X	X
Mill Creek	X	X	X	X	X	X[1/]
Kidder Creek	X	X	X	X	X	X[1/]
Patterson Creek	X	X	X	A	U	X
Etna Creek	X	X	X	A	U	X
French Creek	X	X	X	X	X	X
Miners Creek	X	X	X	No data	X	X
Sugar Creek	X	X	X	X	X	X
East Fork	X	X	X	No data	No data	X
Big Mill Creek	X	X	X	No data	U	X
Grouse Creek	No data	No data	X	No data	No data	X[1/]
South Fork	X	X	X	X	X	X
Boulder Creek	No data	No data	No data	No data	X	No data

[1/] CDFG unpublished data.

Coho juveniles have been found regularly in several French Creek reaches as part of the annual September electrofishing monitoring effort by the French Creek Watershed Advisory Group, although the original intent had been to monitor only steelhead (French Creek WAG 1992; Maria 2002b). Beginning in 1993, juvenile coho were found for the first time, with 7 coho found only in Miner's Creek and no coho in the other 5 reach sites. In 1996, 50 juvenile coho were estimated for 3 sites in the mainstem of French Creek but none in Miner's Creek. In accordance with coho's 3-year lifecycle, a total of 215 coho juveniles were found in 1999, with 65% of these at the Miner's Creek site. In 2000, 2 juveniles were observed at one site and in 2001, 15 fish at two sites. In 2002, the 3-year population pattern emerged again but this time in record numbers – with 628 coho juveniles identified at 5 sites. This pattern has been observed in other watersheds in northern California (NOAA 2001). Coho tended to be found in the deeper pools while steelhead juveniles tended to be found in the riffles.

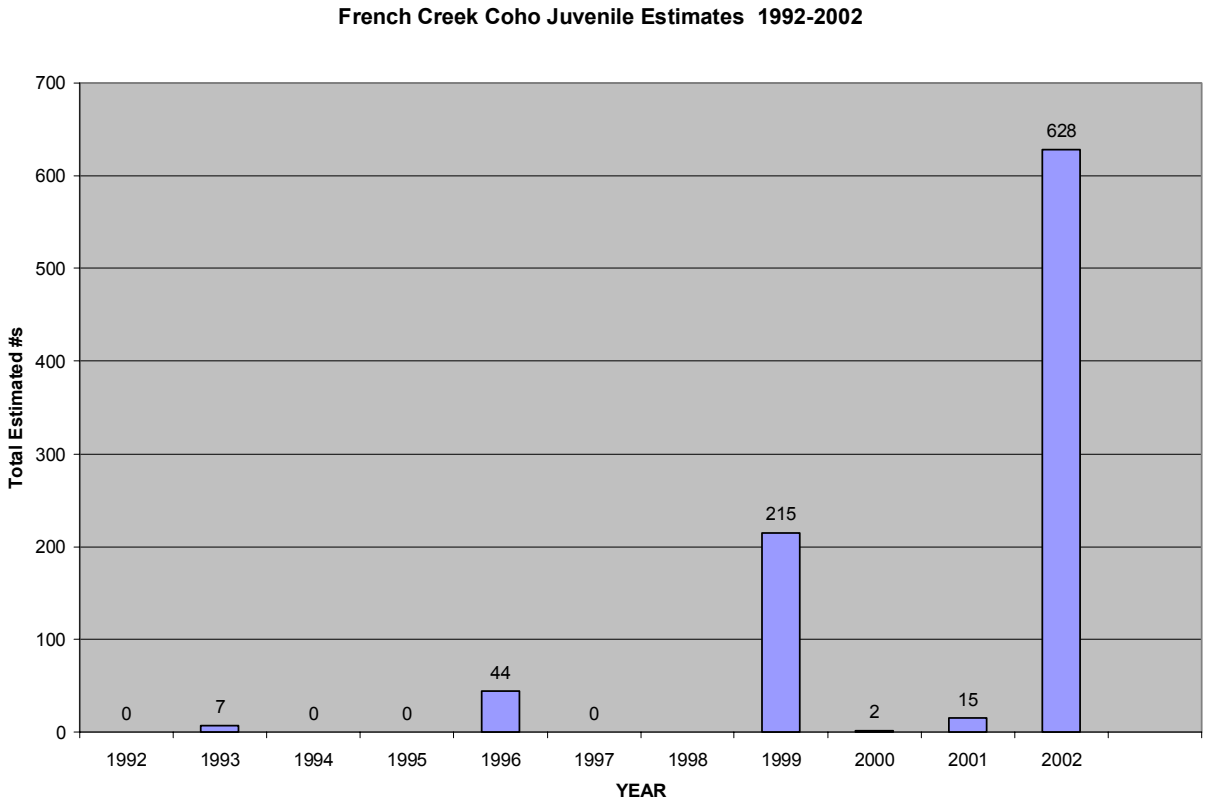


Figure 5. Juvenile coho estimates for French Creek from 1992-2002.

D. Issues for Coho Salmon in the Scott Valley HSA

Coho salmon are adversely affected by a variety of current conditions in the watershed, including reduced stream flows in the mainstem and tributaries, elevated water temperatures, physical and thermal barriers to the movement of adult and juvenile fish, and reduced structural complexity of instream habitat. Issues for coho salmon in the Scott River are briefly outlined below.

1) Reduced stream flows during the dry season and exacerbated by human activities causing:
   a) Increased stream temperatures, which can reach lethal levels for coho juveniles during rearing;
   b) Limited rearing areas during spring, summer and fall;
   c) Restricted coho access to spawning habitat in extreme drought years;
   d) Increased disconnect (on and below alluvial fans) between tributaries and mainstem inhibiting upstream and downstream movement of rearing fish, usually during early July;
   e) Stranding coho juveniles in pools as streams go subsurface earlier than they would naturally;
   f) Lack of sufficient summering habitat in tributaries.
2) Sedimentation of rearing pools and spawning gravels by sediment entering the system as a result of the cumulative effects of upslope land management.

3) High summer water temperatures in rearing areas for coho juveniles resulting from increased solar exposure and increased water travel times due to reduced summer flows, wide undefined channels and lack of riparian cover in some tributary reaches.
4) Reduction of riparian zones. Riparian cover contributes to:
    a) shading, which can help reduce temperature extremes in smaller channels;
    b) bank stabilization through plant root strength;
    c) sources of food & cover for fish.
5) Lack of instream structure for coho's rearing needs.
6) Unscreened water diversions (100% of water diversions within the current distribution of coho in the Scott Valley will be screened by fall 2003).
7) Lack of good information about coho in the Scott system:
    a) Locations of where the coho rear in the Scott system;
    b) Timing of Juvenile use from the various tributaries and main stem, are uncertain;
    c) Spawning locations are only beginning to be identified, beginning in 2001-02 season (Maurer, 2002). It is still not known whether they spawn in the mainstem;
    d) Carrying capacity of existing over summering habitat is unknown.

IV. RECOMMENDATIONS

A. Overview of SSRT Recommendation Categories

Recommendations addressing valley and instream issues in the Shasta and Scott watersheds were developed in seven action categories by small work groups. Due to the limited amount of time and complexity of issues, work groups met outside the regularly scheduled team meetings to develop tentative recommendations for consideration by the whole team. Work groups developed the recommendations using the best available scientific information, both published and unpublished. Please refer to the following websites for more information: the Coho Recovery Website created by the Department (www.cohorecovery.org), the Shasta Valley CRMP Website (users.snowcrest.net/shastacrmp/index.html), and the Scott River Watershed Council Website (www.sisqtel.net/~sisqrcd/srwc/). Work groups also based the recommendations on local knowledge and local experiences with habitat restoration.

The SSRT chose to present recommendations in seven categories based on solutions to watershed issues. An overview of each of the recommendation categories follows:

1. **Water Management:** Recommendations in this category include the following topics: preparation of an Emergency Water Plan, verification of water use for users with water rights, ramped flows for diversions, pulse flows, instream flows, irrigation rotation, installation and maintenance of headgates and measuring devices, instream flow studies, better forecasting, groundwater studies, and instream flow/habitat/temperature modeling.
2. **Water Augmentation:** Recommendation topics are: water trusts, additional surface water storage, small storage opportunities, conjunctive groundwater use, conveyance from the main Klamath, and buying water rights.
3. **Habitat Management:** These recommendations are presented separately for the two watersheds.

    a. **Scott River:** Recommendations for habitat management deal with improvement of: rearing habitat (habitat restoration, flow connectivity, temperature); valley and low-gradient tributary channel structure and function; fish passage (low flow, structures at road crossings, remediation of mine tailings); and spawning gravels.

    b. **Shasta Valley*:*** Recommendations deal with: rearing habitat (identification of current rearing habitat and efforts to maintain it; enhancement of rearing habitat; identification and remediation of various dams and impoundments, high temperatures, and structures at road crossings that are barriers to fish passage); management of spawning gravel; management of riparian vegetation; and temperature.
4. **Water Use Efficiency:** Topics in this category include stock water alternatives, workshops in water use efficiency for landowners, ditch lining and piping, ditch repair and cleaning, irrigation system efficiency, cropping changes, tailwater reclamation, BMPs, and CIMIS (California Irrigation Management Information System).
5. **Protection:** This category includes screening diversions and screen maintenance, protection of riparian zones, fish rescue, and barrier removal.

6. **Assessment and Monitoring:** The recommendations are presented in two categories: habitat monitoring and fish population monitoring. The goals are to collect data that will be needed for both the federal and state recovery programs as they evaluate progress toward recovery and to support the adaptive management for the measures in the other categories. One key issue is obtaining access from landowners.
7. **Education and Outreach:** Education efforts will target not only landowners, but also legislators (federal, state, and local), and local schools. Handbooks, newsletters, a website, active engagement with the local press, demonstration projects, and special events are proposed.

All of the issue categories (Water Management, Water Augmentation, Habitat Management for the Scott and Shasta Rivers, Water Use Efficiency, and Education and Outreach) have been discussed by the entire team and given "preliminary favorable regard." This is a status short of "approval" and has been given with the intent of re-visiting recommendations and deciding if they meet final approval after all have been given preliminary consideration. If an extension of the plan development period is granted by the Commission, the SSRT intends to pursue the establishment of an implementation and permitting framework necessary to allow their final approval of the recommendations.

B. Format and Recommendations by Category

The following recommendations are presented in the order of categories listed in the above overview. A few notes and questions in the recommendations remain to be addressed. The reader is asked to bear in mind that the recommendations have not been given final approval by the SSRT.

A Key to Information in the Tables
Each recommendation is presented in tabular form, with nine columns:

ID is a unique identification number.

Priority has two components:

Importance:
Tier 1 -- critical to coho recovery. Not only is the specified action crucial for recovery, it must precede actions in other tiers, or is essential to avoiding further habitat loss in the near- to mid-term.
Tier 2 -- critical to coho recovery. Recovery cannot happen without implementation.
Tier 3 -- very important for coho recovery. Recovery is not likely to happen without it.
Tier 4 -- important for coho recovery. Recovery would be significantly delayed or limited without it.
Tier 5+ not included.

Timing for implementation:
Near Term = 1-3 years
Medium Term = 2-5 years
Long Term = 5+ years
OG = on-going and/or already started

Recommendation is the text of the recommendation itself.

Status describes current activities or other information relevant to the recommendation.

Lead is the entity best qualified to implement the action. In some recommendations, lead may be covered under implementation.

Short-term Actions are the portions of the recommendation that should be completed within 5 years.

Long-term actions are the portions of the recommendation that are likely to be implemented in more than 5 years.

Costs, when provided, are approximate.

Shasta-Scott Recovery Team Recommendations for Recovery of Coho Salmon

1. Water Management

Area: Klamath River Hydrologic Unit: **Scott River Hydrologic Area (HA) and Shasta Valley Hydrologic Subarea (HSA)**								
Category: Water Management: Emergency Water Plan								
Issues: Low instream flows, especially in drought and dry years, limit habitat for coho salmon and other salmonids. There are no comprehensive plans to deal with supplying instream flows for coho salmon.								
Solutions: Develop a comprehensive, community-based plan that identifies progressive steps to take to obtain, manage, or deal with low water conditions in advance of the event.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WM-1a	Tier 1	Near-term	Ask Scott River Watershed Council (SRWC) to develop an emergency water plan for the Scott. Components would include predetermined funding and prioritized actions for implementation, with identification of who, what, where, when, and how.	There has been difficulty in the past in obtaining funding for preparing the emergency water plan. Voluntary efforts have been used in the past to alleviate drought problems.	SRWC RCD DFG DWR	Seek funding and proceed with plan development.	Use plan to coordinate actions during low-water periods. Plan will define "low-water."	$10,000
WM-1b	Tier 1	Near-term	Ask the Shasta CRMP to develop an emergency water plan for the Shasta. Components would include predetermined funding and prioritized actions for implementation, with identification of who, what, where, when, and how.	There has been difficulty in the past in obtaining funding for preparing the emergency water plan.	CRMP RCD DFG DWR	Seek funding and proceed with plan development.	Use plan to coordinate actions during low water periods. Plan will define "low-water."	$10,000

Category: Water Management: Verification of Water Diversions with Water Rights

Issues: Currently the Shasta River and 5 creeks in the Scott Watershed are under State Watermaster Service. The main Scott River and other tributaries, while under decree, are not under either State or private watermaster service. Watermasters allocate and manage water diversions so that each diverter receives water according to his or her right as defined in the decree. In the non-watermastered areas, diverters may not be diverting their correct allotment and there is no verification that diverters are correctly following their adjudicated right; if diverters are taking more than their right, it may be impacting instream flows, Coho habitat, and water-right holders.

Solutions: Careful management and verification of diversion amounts according to existing decrees may increase flows. Recent DWR efforts to more precisely manage diversions on the watermastered streams have produced prolonged higher instream flows in the summer season. Watermasters also are able to manage volunteered or dedicated instream flows.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Import-ance	Timing						
WM-2a	Tier 1	Near-term	Add additional oversight and provide more people to verify water use and better manage water in current watermaster service areas (Shasta and Scott).	Current DWR staff (1.5 PY) oversee hundreds of diversions; in 2002 DWR expanded watermaster service beyond the irrigation season and provided direct management oversight.	DWR	Seek and support additional funding and authorization to add one additional person to work in the area already watermastered by DWR. Include verification data in the annual report.	On-going	$100,000 per year
WM-2b	Tier 2	Near-term	Work with diverters covered by the Scott River Decree to confirm they know exactly their rights.	New initiative	DWR SWRCB	Hold voluntary one-on-one meetings with diverters and conduct a diverters' workshop for each schedule.	Continue periodic diverters workshops.	Small
WM-2c	Tier 1	Near-term	Provide assistance for voluntary flow measurement of current non-watermastered diversions on the Scott.	DWR watermasters have provided flow measurements to individuals and groups at their request as time allows.	DWR	DWR staff can continue to provide service as needed. DWR can train others (SRWC, RCD staff) on flow measuring techniques.	Continue to provide service and training as needed.	Small

Category: Water Management: Verification of Water Diversions with Water Rights (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-2d See also WM-9	Tier 1	Near-term	Verify compliance with water rights as contained in the Scott River Decree using a phased implementation period for currently un-watermastered areas. 100 percent verification is the goal.		DWR	1. During 2003 and early 2004, diverters on a given reach will choose to have usage verified under one of the following options: a. Independent and accountable private watermaster, who coordinates with DWR, b. Allow DWR to access sites for compliance (individual), c. Watermaster by DWR with no fee, or d. Other mechanisms to be determined. 2. After 7/1/04, DWR will assess and report on the adequacy of the verification efforts. If sufficient, continue. If not sufficient (not enough volunteers or inadequate results), solicit water users for adoption of Watermaster Service. (Fifteen percent of the diverters within the decree can request State Watermaster Service.) 3. If DWR is not able to verify compliance with the decreed water rights by 1/1/05, seek State Water Resources Control Board oversight and verification. 4. Develop a standard format for collection and reporting of diversion data. 5. Seek and obtain funding for the first three years.	Seek state funding for general-fund portion of long-term Watermaster Service and implementation. Include water users in a DWR request for an incidental take permit for Watermaster Service. NOTE: Discuss take authorizations more globally as part of administration.	

Category: Water Management: Ramped Flows for Diversions

Issues: Especially at the beginning of the irrigation season, a significant number of irrigators often begin diverting at the same time. This action may severely lower water levels almost instantaneously, causing fish stranding or other impacts.

Solutions: Institute a cooperative agreement between diverters to stage their irrigation starts and completions to gradually change flows over several days.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Import-ance	Timing						
WM-3a	Tier 2	Near-term	On the Shasta River, through Shasta CRMP, DWR and irrigators' cooperation, establish a voluntary program to stagger or rotate irrigation starts and completions (ramped flows). Monitor success.	This has been done in the past with some success. It improves conditions for early fall Chinook spawners and reduces stranding potential for coho in the spring.	CRMP RCD DWR DFG	Continue and expand this effort.	Continue appropriate implementation, monitor, and adaptively manage. Develop a long-term plan for implementation.	None or small
WM-3b	Tier 4	Medium	On the Scott River, investigate if ramping would be beneficial or necessary.		SRWC RCD DWR DFG	Survey water users, DFG, and watermaster staff. Publish results. Begin implementation if appropriate.	Continue appropriate implementation. Monitor and adaptively manage. Develop a long-term plan for implementation.	$10,000

Category: Water Management: Pulse Flows								
Issues: Juvenile outmigrants or other life stages may have difficulty migrating during some periods.								
Solutions: Produce a pulse of flow, which will aid in migration								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-4a	Tier 3	On-going	On the Shasta, the Shasta CRMP and DFG, through voluntary participation and compensation, develop an agreement under which landowners pull diversions for a limited period to allow a resulting pulse flow to travel downstream.	This program has been done in the past with some success. It mainly targets Chinook smolts, but may provide brief passage windows upstream for coho, and may provide an improvement in water quality by removing organic build-up. Options for pulse flows are limited by lack of storage.	CRMP RCD DFG DWR	On the Shasta, implement voluntary program among diverters to create pulse flows; augment with cost funding as needed. Monitor both flow and fish distribution results. Integrate findings of flow-temperature model in planning. Establish a monitoring protocol.	Reduce and eliminate barriers and water quality problems that create need for it in the first place. Integrate this effort with TMDL process.	Moderate
WM-4b	Tier 4	Medium	On the Scott, DFG should research with the SRWC and RCD to determine if some streams could benefit with a pulse flow	This effort has been done on the mainstem for Chinook spawners with some success. Options for pulse flows are limited by lack of storage.	DFG	Implement research recommendations.		Modest

Category: Water Management: Using Unused Water and Water Rights for Instream Fish Flows								
Issues: Low instream flows limit habitat for coho salmon and other salmonids.								
Solutions: Some water rights are currently not being exercised under existing decrees. Work within the water rights process to allow water rights holders to temporarily dedicate currently unused rights to instream flow.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-5a	Tier 1	Near-term	DWR and SWRCB should outline the procedure for developing instream flow dedications. Develop incentives for acquiring instream flow.	Preliminary advice from SWRCB is that by changing water use to include instream flow as well as irrigation (Section 1707 of the Water Code), water can be used in either purpose in future years without affecting the right. This is subject to approval of the court.	DWR SWRCB	Watermasters will: a. continue and expand opportunities to help manage flows on some streams; b. develop an informational report to describe the process and incentives; identify potential for future measures; c. develop guidelines to protect water users, inform funders, and ensure that water is used for instream flows.		Small
WM-5b	Tier 2	On-going	On the Scott, SRWC and DWR should determine unused diversion rights and approach those diverters about providing flows for instream use without affecting the water rights of others.	Dedication of some unused water for instream flows was coordinated by DWR in watermastered streams in 2002; will continue in 2003.	SRWC RCD DWR	Once agreements are reached, work to inform other downstream users as to water amounts to be left in the stream. Oversee and shepherd those flows.	Acquire flows for permanent dedication.	Variable

Category: Water Management: Using Unused Water and Water Rights for Instream Fish Flows (continued)								
Issues: Low instream flows limit habitat for coho salmon and other salmonids.								
Solutions: Some water rights are currently not being exercised under existing decrees. Work within the water rights process to allow water rights holders to temporarily dedicate currently unused rights to instream flow.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-5c	Tier 2	On-going	On the Shasta, the CRMP and DWR should determine unused diversion rights and approach those diverters about providing flows for instream use without affecting the water rights of others.	There are a multitude of under-used small water rights and the disposition of that water is unknown.		Once agreements are reached, work to inform other downstream users as to water amounts to be left in the stream. Oversee and shepherd those flows.	Acquire flow for permanent dedication. Include options for Dwinnell, Greenhorn, and other storage reservoirs.	Variable

Category: Water Management: Irrigation Rotation Program								
Issues: Low instream flows limit habitat for coho salmon and other salmonids and inhibit movement of coho juveniles to secure rearing habitat.								
Solutions: For certain stream and river reaches, diverters could rotate irrigations so not all users are on line at the same time when flows are critical for fish. This would leave additional flow in the stream to maintain or enhance habitat at critical times.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-6a	Tier 3	On-going	Within watermastered areas, DWR watermasters could work closely with irrigators to develop creative water management techniques to benefit coho. Develop incentives. Focus on key areas.	This concept was tested during 2002 fish rescue operations on Shackleford Creek. On the Shasta River, the week before County fair is often problematical regarding flows.	DWR	DFG should identify critical habitat reaches and times that might benefit from this activity. DWR should continue pilot program. On the Shasta River, demand on river is variable and coordination among users might help avoid accidental problems.		Small
WM-6b	Tier 3	Medium	On non-watermastered reaches of the Scott River HA, develop a test program with tributary groups.		SRWC RCD DWR	Contact various tributary or ditch groups to assess willingness and difficulty. Execute pilot program. Write up results.	Continue to work with groups on irrigation coordination and other water management; expand as warranted.	$50,000

Category: Water Management: Install Head Gates and Measuring Devices on Diversions

Issues: Low instream flows limit habitat for Coho Salmon and other salmonids and inhibit movement of coho juveniles to secure rearing habitat. Many diversions do not have flow control devices or ways to measure discharges into the diversion. Without control structures and accurate measurements, diversions cannot be managed easily for changing stream flows and some users could be diverting more than their proper allotments. (See also WM-2 for verification.)

Solutions: Provide head gates and measuring devices for diversions.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Import-ance	Timing						
WM-7a	Tier 1	On-going	Within watermastered areas, continue DWR's program of constructing head gates and measuring devices on diversions.	The current program to build 55 structures is funded through a grant from DFG; this contract expires in 2004. Head gates and measuring devices are required for watermastered streams under the Water Code.	DWR	Seek additional funding for these structures to help encourage timely installation. Install on all watermastered diversions by 2006.		$300,000 per year for 2 years = $600,000
WM-7b	Tier 2	Near-term	Seek additional funds to provide structures for willing irrigators in non-water-mastered areas; DFG, DWR, SRWC or RCD could participate.	DFG requires head gates and measuring weirs on all new fish screen grants.	DWR DFG	Seek funding to provide measuring weirs and devices to willing irrigators. Install weirs and measuring devices as requested. (See recom-mendation WM-7a.)	Continue program until all diversions have gates and are measurable.	$300,000 per year for 2 years
WM-7c	Tier 3	Medium	On Shasta River, riparian users should participate.	No measuring devices are required.	DWR CRMP RCD	Provide devices to riparian users. Set up voluntary diversion reporting process so the Watermaster knows what riparian users are doing.		

Category: Water Management: Water Availability Projections and Forecasts								
Issues: Lack of prediction of water-year type limits opportunities for water management. Lack of short-term predictions similarly constrains planning for mid-season water use.								
Solutions: Forecasting stream flows for the water year based on snow surveys, precipitation, and aquifer condition within the season could aid water management techniques, such as irrigation rotation and harvesting, and thereby provide additional instream flows and habitat.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-8a	Tier 3	Medium	On the Scott, DWR, SRWC, USFS, and other partners should study the correlation of stream flow with other parameters to closely predict weekly flow rates (cfs).	The RCD and SRWC currently have funding to develop a water balance. Additional monitoring of flows and precipitation will be conducted.	DWR SRWC RCD	Develop work/study plan. Collect additional data. Hire consultant /team. Implement. Seek additional funding to initiate and implement a predictive program.	On-going.	Moderate
WM-8b	Tier 3	Medium	On the Shasta, DWR, USFS, Shasta CRMP and other partners should study the correlation of stream flow with other parameters to closely predict weekly flow rates (cfs)	Implementing any kind of critical-year emergency program depends on the ability to forecast need.	DWR	Develop a work/study plan. Collect additional data. Hire consultant/team. Implement. Seek additional funding to initiate and implement a predictive program.	On-going	Moderate

Category: Water Management Instream Flow Studies and Recommendations								
Issues: Flow-habitat relationships for coho salmon have not been established and the amount of habitat required for coho recovery has not yet been identified								
Solutions: Conduct an instream flow study to develop the relationship between flows and habitat. Develop the relationship between flow and habitat availability for the different life stages of coho salmon								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-9	Tier 1	Near-term	DFG and USFWS in cooperation with the community should seek funding to conduct instream flow studies on the Scott and Shasta to determine flow-habitat relationships. Quantify how much, where, and when stream flow is needed for coho rearing life stages.	USFWS is currently involved in the Klamath Instream Flow Study, which will include Scott and Shasta rivers. Initial stages of some studies are currently underway. Both rivers have been flown for aerial photos. A subcommittee of Fish Com is preparing a Limiting Factors Analysis that may provide answers to some questions. DFG does annual shocking surveys in reference reaches. RCD Water Balance project is moving forward. Flow gauges are presently installed in the Scott River.	DFG USFWS USFS USGS	As an interim measure and in coordination with the Emergency Water Plan and other recommended water management measures, identify target minimum instream flows for the tributaries that provide coho summer rearing habitat. Use the best, scientifically valid method suitable for the analysis. Seek funding and carry out study using agreed-upon scientists identified by the Shasta CRMP and the Technical Committee of the SRWC. Explore different instream flow assessment methods including, 1D and 2D modeling, microhabitat mapping, hydrologic modeling and others. Use Water Balance information, including feasibility aspects. Evaluate potential application of Bureau of Reclamation Klamath Irrigation Project Conservation Implementation Program.	Integrate findings into watershed planning processes.	High

Category: Water Management: Groundwater Studies								
Issues: Low instream flows limit habitat for Coho Salmon and other salmonids and inhibit movement of coho juveniles to secure rearing habitat. Some groundwater withdrawals appear to be linked to surface flows, but effects are not conclusive given other factors (climate change, precipitation variations, upland vegetation changes and removed barriers).								
Solutions: Study groundwater availability in the Scott and Shasta Valley to determine groundwater status and potential needs and opportunities regarding groundwater management.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-10a	Tier 1	Near-term	DWR, the Shasta CRMP, and other partners should seek funding and cooperators to conduct a comprehensive groundwater study of the Shasta Valley.	First stage proposed to DFG in 2002, but not funded; re-submitted to DFG and USFWS in 2003. Partial funding received from USFWS.	DWR CRMP RCD County	Seek funding; conduct the study; make recommendations that would help preserve or enhance instream flows. Look at using groundwater from wells not connected with the river during low-flow periods and effect of infiltration from unlined ditches. Lead agencies will apply for funds for 2-year study by May 2004	Implement recommendations as applicable. Coordinate results with water supply augmentation options.	Moderate

Category: Water Management: Groundwater Studies (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-10b	Tier 1	Near-term	Prepare a comprehensive study updating previous work by USGS (Seymour Mack 1958) and DWR to determine the current status of groundwater in the Scott Valley and its relationship to surface flows. Studies should include factors such as climate change, adjudications/decree verification, precipitation variability, changes in upland vegetation and removal of diversions and natural dams (e.g. beaver dam) that would have elevated groundwater levels.	DWR currently monitors wells monthly; data are on the web. Some preliminary analyses have been conducted.	DWR SRWC RCD County	Obtain funding to update the study. Find additional wells and cooperative landowners to measure monthly groundwater levels and develop current groundwater contours. Analyze data to assess management options. Look at using groundwater from wells not connected with the river during low flow periods. Lead agencies will apply for funds for 2-year study by May 2004	Coordinate results with water supply augmentation options.	Modest

Category: Water Management: Groundwater Studies (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-10c	Tier 2	Medium	Prior to groundwater study completion, recommend County establish process for developing groundwater management plans. If the comprehensive groundwater study shows the necessity, the County should initiate a basin-specific groundwater plan to protect the resource of groundwater for all users, including fish.	Without the results of the groundwater studies, specific short-term or long-term actions cannot be recommended. DWR has given a letter to County pledging technical support and assistance in developing groundwater plans.	County	Review results of groundwater study and previous county work. Recommend that by 2005, the County appoint a broadly representative, community based steering committee to develop the idea. Formalize the process for preparing basin-wide plans using groundwater study results.	Implement plan Beginning in 2006, review and analyze study results and determine thresholds and actions to protect resource for all users.	

Category: Water Management: Water Balance Study								
Issues: The connection between surface water and groundwater and the sources and sinks of water are poorly understood. This lack of knowledge limits the ability to take actions to increase instream flow and maintain the groundwater levels necessary to support riparian vegetation.								
Solutions: Conduct studies that will provide the missing information and use that information to guide water management, water augmentation, and habitat enhancement.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-11a	Tier 2	On-going	Support completion of the Scott River Water Balance Study to learn how water behaves in the river, in particular establish the fate of water added to the Scott River to increase instream flow. The study should identify the best locations to augment flow and predict the impact of the additional water at downstream locations. Apply the results of the completed Water Balance Study to water management, water augmentation, and habitat enhancement recommendations.	SRWC has completed the first phase of the Water Balance Study. Michael Deas has been hired to determine what additional data and analyses are needed to complete the water balance.	SRWC RCD	Obtain funds to complete Water Balance Study. Use results to guide projects that will support improvement to coho habitat.	Continue implementation.	

Category: Water Management: Water Balance Study (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WM-11b	Tier 3	Medium	Support preparation of a water balance study for the Shasta River to learn how water behaves in the river, in particular establish the fate of water added to the river to increase instream flow. The study should identify the best locations to augment flow and predict the impact of the additional water at downstream locations. Apply the results of the completed study to water management, water augmentation, and habitat enhancement recommendations.			Obtain funds to prepare Water Balance Study. Use results to guide projects that will support improvement to coho habitat.		

2. Water Augmentation

Area: Klamath River Hydrologic Unit: **Scott River Hydrologic Area (HA) and Shasta Valley Hydrologic Subarea (HSA)**								
Category: Water Augmentation: Water Trust (water leasing)								
Issues: Low instream flows limit survival and growth during some coho life stages.								
Solutions: Provide a structured process for willing participants to donate, sell, or lease water or water rights to provide improved stream flow for coho salmon and habitat at critical periods.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WA-1a	Tier 1	On-going	Support the ongoing efforts of the Scott River water trust to create an endowment that will support the Trust as a non-permanent agent for buying water to augment instream flows.	Phase 1 of the Scott River water trust is funded by an $82,864 grant from DFG to: summarize legal options; describe various leasing and acquisition scenarios; describe current hydrologic conditions and potential areas to benefit anadromous fish; review and summarize findings; list possible institutional mechanisms available, including an MOA among agencies; hold local workshop; and provide description of the economic components of a local water trust entity. Preliminary draft report July 2003; final report May 2004.	SRWC RCD DWR	Complete the Phase 1 study funded by DFG grant; Phase 2, implementation of the Water Trust, will occur no later than 2006 if Phase 1 supports feasibility of the process. Verification of the adjudication should be a concurrent activity to use of the Water Trust to ensure that legal use of water is addressed and that flows reflect this.	Continue as needed with the expectation that instream flow issues will be addressed and remedied, making this function less important.	Moderate

Category: Water Augmentation: Water Trust (water leasing) (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WA-1b	Tier 1	Near-term	Promote the establishment of a Shasta River Water Trust.	This effort will be dependent on the results of the legal analysis being conducted for the Scott River water trust.	CRMP RCD DWR	Explore options to create the Shasta River Water Trust and implement as applicable. Identify willing participants in the short term until longer-range solutions are available or in place.	Continue as needed with the expectation that instream flow issues will be addressed and remedied, making this function less important.	Modest
WA-1c	Tier 3	Medium	Create an endowment to provide funding for water leasing and purchase.		SRWC CRMP RCD	Find commitment for funding a water leasing or purchase program. Solicit agency support. Evaluate potential application of Bureau of Reclamation Klamath Irrigation Project Conservation Implementation Program.		Modest

Category: Water Augmentation: Water Trust (water leasing) (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WA-1d	Tier 3	Medium	Initiate measures to create or enhance instream flows by reducing irrigation starting in September to promote access and connectivity of existing spawning areas; capitalize on available adult returns. Where this applies to rearing areas, it would also benefit juveniles. NOTE: Make sure fall flows are addressed in habitat management category (HM-3).	Could be part of current water trust development.	SRWC CRMP	(1) Prioritize streams where benefit will be greatest; (2) Solicit cooperation from water users; (3) Develop a contact list; (4) Acquire funding; (5) Form a water management group to manage the money and develop an implementation strategy, including long-range planning for growers. Implementation in Summer 2004. Investigate option for participators to not irrigate after September 1 (e.g., a fourth alfalfa crop) with this water dedicated to instream flows in exchange for appropriate reimbursement.	Continue as necessary	Moderate

Category: Water Augmentation: Study Additional Large Surface Water Storage								
Issues: Low instream flows limit survival and growth during some coho life stages. Winter runoff once out of the system cannot be recovered to provide year round flows at critical times to benefit coho salmon.								
Solutions: Study the feasibility of building storage reservoirs to capture excess winter runoff and manage stream flows more for the benefit of coho salmon. Implement if feasible and acceptable. The intent of the stored water would be to benefit coho, not to increase the irrigation acreage or volume.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WA-2a	Tier 4	Medium	Initiate reconnaissance level studies to identify possible surface storage opportunities and possible fatal flaws for those alternatives in the Shasta River watershed. Off-stream reservoirs may provide storage yet maintain current or improved fish habitat. The study should identify management alternatives.	Most winter water in the Shasta River watershed is already captured and few opportunities exist without out-of-basin transfers.	DWR	Identify environmental concerns for additional water storage, including those on steelhead and Chinook and develop proposal to alleviate. Initiate reconnaissance level study of increasing storage at Lake Shastina and opportunities for use of water from Greenhorn Reservoir.	Seek funding for and implement feasible projects.	Moderate

Category: Water Augmentation: Study Additional Large Surface Water Storage (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WA-2b	Tier 3	Medium	Initiate reconnaissance level studies to identify possible surface storage opportunities and possible fatal flaws for those alternatives in the Scott River watershed. Off-stream reservoirs may provide storage yet maintain current or improved fish habitat. The study should identify management alternatives.	DWR and USFS have done studies in the past, but those options generally involve traditional on-stream dams. Could have problems with buy-in.		Look into historical and proposed water storage reservoirs; expedite the process at the elected official and agency levels. Consider potential impacts on Chinook and steelhead. Consider Noyes Valley, Wildcat Creek, Kidder Valley off-stream and other off-stream and upslope sites. Consider option of ditching or pumping water to storage area. Determine how to avoid usual problems with water storage, such as infilling of the storage structure with sediment, address channel maintenance flows, etc.	Seek funding for and implement feasible projects.	Moderate

Category: Water Augmentation: Small Storage Opportunities (off-stream or high mountain lakes)								
Issues: Low instream flows limit survival and growth during some coho life stages. Winter runoff once out of the system cannot be recovered to provide year round flows at critical times to benefit coho salmon.								
Solutions: Raise the levels of existing small lakes or create storage using small off-stream reservoirs rather than one large reservoir.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WA-3a	Tier 3	On-going	Study raising additional mountain lakes in a reconnaissance level effort.	Cliff Lake rehabilitation proposal is being organized. Most opportunities appear to be in the Scott River watershed. This option is potentially limited by concerns about Wilderness Areas.	DWR	Support current partnership effort to rehabilitate Cliff Lake to provide 150 acre-feet of water for Coho rearing and migration; Identify USFS small storage locations that have not been maintained.	Seek funding for and implement feasible projects.	Modest
WA-3b	Tier 3	Medium	Study using small, off-stream ponds for increased storage.		SRWC CRMP DWR	Identify options for off-stream storage on public and private lands.	Seek funding for and implement feasible projects.	Modest

Category: Water Augmentation: Store Water with a Conjunctive Groundwater Use Program and Groundwater Recharge Ponds								
Issues: Low instream flows limit survival and growth during some coho life stages.								
Solutions: Initiate reconnaissance level study of operating surface storage in conjunction with groundwater storage. Establish groundwater recharge ponds that receive and capture high winter river and stream flows and allow that water to percolate and recharge the aquifer. Recharging/maintaining the groundwater may be used to increase stream flows (e.g., recharging groundwater that is connected to the surface flows or using the groundwater to replace surface diversions).								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WA-4a	Tier 3	Medium	Along with general groundwater investigation on the Shasta (see WM-10a), include coordinating groundwater storage with operation of Lake Shastina.	DWR currently has a small groundwater monitoring program in place in the Shasta Valley	DWR	Conduct Shasta Groundwater Study to obtain basic data. Evaluate potential application of Bureau of Reclamation Klamath Irrigation Project Conservation Implementation Program.	Look at options for conjunctive use in specific study.	Moderate
WA-4b	Tier 3	Medium	On the Scott, as part of both the general groundwater investigation and the surface reservoir investigation (see WM-10b), include conjunctive groundwater operation.	DWR currently has a modest groundwater monitoring program in place in the Valley.	DWR	Find funding and implement reconnaissance level study. Evaluate potential application of Bureau of Reclamation Klamath Irrigation Project Conservation Implementation Program.	Pursue feasibility study and implement if warranted.	Moderate

Category: Water Augmentation: Store Water with a Conjunctive Groundwater Use Program and Groundwater Recharge Ponds (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WA-4c	Tier 2	Near-term	On both the Scott and Shasta, investigate the most efficient ways to recharge groundwater. Mechanisms could include recharge ponds, unlined ditches, or others. Evaluate pre-season flooding of agricultural land for groundwater recharge.	The current extent of groundwater recharge is unknown.	DWR UC Co-op Ext. County SRWC CRMP NRCS RCD	Find funding and initiate groundwater and hydrologic studies, develop groundwater management criteria (yield and withdrawal criteria), identify possible recharge locations, and conduct reconnaissance level studies, which includes legal aspects. Evaluate potential application of Bureau of Reclamation Klamath Irrigation Project Conservation Implementation.	Pursue feasibility study and implement if warranted.	Modest

Category: Water Augmentation: Scott Valley Tailings Water Storage								
Issues: Low instream flows limit survival and growth during some coho life stages.								
Solutions: On the Scott River, reshape dredge tailings to provide additional water storage within the remaining tailings.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WA-5	Tier 3	Medium	Initiate reconnaissance-level study on options for a tailings rehabilitation and water storage project. Pursue viable options; coordinate water storage with restoration.	Some mapping has been funded by USFWS that can be helpful for this study.	County	Find funding and implement reconnaissance level study.	Pursue feasibility study and implement if warranted.	Substantial

Category: Water Augmentation: Water Conveyance to Shasta Valley from Main Klamath								
Issues: High water temperatures and low instream flows limit survival and growth during some coho life stages.								
Solutions: A water diversion of between 100 and 200 cfs from the mainstem Klamath River above Iron Gate Reservoir could provide irrigation water to the Shasta Valley greatly reducing the need for water diversions and ground water pumping for agricultural purposes. The majority of the low temperature, high quality water from the Shasta River would then be left instream to the benefit of spawning and rearing coho salmon.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WA-6a	Tier 1	Near-term	Study the legality of a Klamath-to-Shasta diversion.	California has reserved two place markers totaling 120,000 acre-feet for use in the Shasta Valley along with the reserved right tied to the Iron Gate Dam Project that amounts to 220,000 acre-feet. Preliminary legal review is funded and results are expected in mid-2003.	CRMP	Verify the legal status of the several reserved water rights for the Shasta Valley, and map out the best strategy to exercise them. Coordinate with the relicensing before FERC.		$6000-7000

Category: Water Augmentation: Water Conveyance to Shasta Valley from Main Klamath (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WA-6b	Tier 2	Medium	Conduct Feasibility Study	DWR (Bulletin 83, Klamath Basin Investigation; Bulletin 87, Shasta Valley Investigation; has done some investigation in the past. Other studies (Bureau of Reclamation in the 1920s and those being done as part of the FERC relicensing) may also be available shortly.	CRMP	Study engineering and environmental considerations of the various point-of-diversion possibilities, including capital and operation costs and biological and ecological considerations. Select most promising approach. Determine how much water is needed in Shasta Valley with Dwinnell Dam intact and without Dwinnell Dam.		Substantial

Category: Water Augmentation : Acquiring Water Rights								
Issues: Low instream flows limit survival and growth during some coho life stages								
Solutions: Acquire water rights that shall be dedicated to instream flow.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WA-7a	Tier 1	Near-term	Conduct reconnaissance-level investigations.	Some information is available.	DWR	Conduct cost-benefit analysis that includes socio-economic effects to community and legal considerations; Present options and survey public support. Proceed as warranted.		Modest
WA-7b	Tier 2	Near-term	Depending upon study, engage and support projects	Could have problems with buy-in.		Solicit interest from willing participants. Evaluate potential application of Bureau of Reclamation Klamath Irrigation Project Conservation Implementation.	Continue short-term actions.	Moderate
WA-7c	Tier 2	Near-term	Apply the results of appropriate studies (e.g., water balance, instream flow, coho population surveys) to prioritize the purchase of water rights.		Various	Complete and synthesize studies; fund implementation.		

Shasta-Scott Recovery Team Recommendations for Recovery of Coho Salmon

3a. Habitat Management and Restoration – Scott River Valley

Area: Klamath River Hydrologic Unit: Scott River Hydrologic Area (HA)

Category 1: Habitat Management and Restoration: Improvement of Summer and Winter Rearing Habitat

Issue 1: Lack of Habitat Complexity. The Scott River watershed has experienced a loss of summer and winter rearing habitat for juvenile coho. Juvenile coho naturally move throughout the year looking for suitable temperature, cover, flow velocity, and food supply. Large logs, small woody debris, boulders, pools, side channels, beaver ponds, springs, and accessible wetlands provide habitat complexity and are "safe havens" for coho juveniles. Protection from high flows, such as can be found around large structures in the stream or in backwaters connected to the stream, is necessary for over-wintering survival of juvenile coho. Riparian vegetation provides habitat complexity and is an important element supporting juvenile rearing habitat for coho. Riparian vegetation has been reduced for a variety of reasons, including lowering of the water table and channel destabilization. Current information shows a positive relationship between coho presence and beaver ponds. The valley was historically heavily populated with beaver until mid-1800s. Today small populations exist. The rather stable ponds created by these animals, especially on valley tributaries, likely created year round fish rearing habitat, including the period of low stream flow. Changes in stream channel form and function may have limited riparian restoration potential. Changes in hydrologic conditions, such as changes in groundwater and water use may also limit riparian restoration potential. The loss of off-channel habitat results in a loss of productive rearing and over-wintering areas, often favored by species such as the coho salmon.

Solutions: Identify and conserve existing rearing habitat. Restore lost rearing habitat where possible. In locations where there are problems, increase habitat complexity. Find new ways to increase riparian vegetation in addition to continuing current efforts.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Import-ance	Timing						
Scott HM-1-1a	Tier 1	Near-term	Study the habitat needs of rearing coho in the Scott River watershed. Identify critical existing coho rearing habitat. For the protection of riparian habitat, see recommendation P-2.	At present data gaps exist for pertinent information; data collection has not been able to proceed in important river and tributary sections due to lack of access and funding, and other factors. Tributaries such as French, Mill, Shackleford, and Sugar creeks have already been identified as good rearing habitat.	CDFG SRWC RCD USFS	Secure funding; work with landowners to gain access; explore methods to obtain the necessary data to implement the appropriate coho recovery projects; develop an action plan to prioritize projects. Coordinate with other ongoing agreements and scheduling.	Implement and evaluate projects.	$300,000

Category 1: Habitat Management and Restoration: Improvement of Summer and Winter Rearing Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-1-1b	Tier 2	Near - term	Identify methods for increasing habitat complexity and appropriate locations for instream habitat structures to create pools, increase habitat complexity, and improve bank stabilization. All bank stabilization projects should be done in a fish-friendly manner.	Tailings are an important factor contributing to excessive streambank erosion and loss of habitat complexity. In the mainstem, rearing habitat is limited by the influence of tailings, bed aggradation and down-cutting in different reaches, and low flows limit habitat complexity. Large portions of the mainstem and some portions of the tributaries have been rip-rapped (___% of stream rip rapped –53 stream miles)	SRWC RCD	Research and quantify locations and develop restoration plans for them. Define what constitutes fish-friendly bank stabilization. Evaluate existing alternative bank stabilization methods. Continue to seek funding and carry out specific projects.	Assess and monitor activities to determine whether or not instream structures are working properly and doing no harm. There should be a decreasing need to install instream structures as natural river channel processes (i.e., channel meander, riparian vegetation recruitment, reduced sedimentations, etc.) are improved.	

Category 1: Habitat Management and Restoration: Improvement of Summer and Winter Rearing Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-1-1c	Tier 3	On-going	Encourage riparian restoration projects using locally native vegetation. Project implementation should consider if: 1) the site previously supported riparian vegetation and still has the soil and hydrologic characteristics to support it; 2) the native plants selected are likely to flourish; 3) the width of the planted riparian zone is appropriate for the hydrologic regime at the site; and 4) the plan includes effectiveness monitoring using approved protocols. Establish procedures for recommending appropriate plant materials where natural conditions are significantly compromised.	168 acres on the mainstem have been replanted with varying success. NOTE: Plant selection in Admin; Fencing in Protection	SRWC RCD	Support on-going riparian restoration efforts and continue to seek funding and carry out projects with an emphasis on the tributaries, especially those identified as potentially major coho streams. Evaluate outcomes of replanting and research causes of riparian planting outcomes, appropriate width of planted areas, and new strategies for restoration. Monitor past projects to secure updated information on most effective techniques.	Assure implementation monitoring with emphasis on protecting the coho salmon refugia.	

Category 1: Habitat Management and Restoration: Improvement of Summer and Winter Rearing Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-1-1d	Tier 2	On-going	Continue riparian easement programs.	Many landowners are already signed up in the NRCS program RR/CRP.	NRCS and others	Seek cooperation from local landowners. Compensate land-owners for short- or long-term protection of their riparian property.		
Scott HM-1-1e	Tier 3	Medium	Evaluate the use of beaver ponds and other efforts that contain similar benefits to increase habitat complexity.	Historically, beaver ponds were associated with many of the low gradient tributaries mentioned above. Year round beaver ponds may have also been associated with areas of elevated water tables and upwelling groundwater. Beaver populations have been greatly reduced. Refer to CRMP programs.	DFG	Review literature (studies done in Washington and Oregon). Hold workshops and publish newsletters as appropriate. Investigate projects in prioritized areas to support beaver activity if appropriate. Coordinate with related projects to improve stream complexity and habitat. If projects are planned, ensure that riparian growth is adequate or provide materials for beaver needs, so that appropriate riparian cover is maintained.	Include implementation monitoring. If beaver re-introduction fails or is found to be inappropriate, consider analogous habitat attribute efforts.	

Category 1: Habitat Management and Restoration: Improvement of Summer and Winter Rearing Habitat

Issue 2: High Water Temperatures. Water temperatures are influenced by amount of river flow, and river structure (W/D ratios, etc.), air temperature, shading from terrain and vegetation, influx of groundwater, tributary flow and runoff, and other factors, including aggraded streambeds and sedimentation. High water temperatures can stress coho, increasing disease and mortality.
Water temperature is listed as a significant problem for the Scott River (303d impaired) and the condition is associated with current summer flow regime and the valley structure of the river (high width to depth ratios). Water temperature influences the development and survival of coho salmon by affecting different physiological processes such as growth and smoltification. Water temperature affects migration timing and the fishes' ability to cope with predation and disease and exposure to contaminants. High water temperatures also create thermal barriers to migration.

Solutions: Identify and remedy conditions that contribute to high water temperatures. Restore structure of river. Modeling water temperature and flow relationships in the mainstem will help guide the timing of water additions to the river and selecting the best locations for restoration of water table, meander pattern, and slope.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Importance	Timing						
Scott HM-1-2a	Tier 1	Near-term	Identify location, timing, frequency and duration of thermal barriers to migration for adult and juvenile coho salmon. Develop habitat improvement measures that address temperature.		DFG	Identify and map locations and timing of thermal barriers. Coordinate information and projects to address appropriate solutions in prioritized areas with the most benefit to coho salmon.	Implement projects or measures in coordination with over-all habitat recovery process and monitor for improvements in an adaptive fashion.	
Scott HM-1-2b	Tier 4	Medium	Investigate the contribution to stream cooling of the flow of cool water through gravel. Investigate the interference of fine sediment in that process.	TMDL process may address this issue in summer 2003. NOTE: Admin group to deal with selection of experts for all studies.	SWRC RCD	Seek funding and carry out study using agreed-upon scientists identified by the Technical Committee of the SRWC.	Use results to plan projects and drive adaptive management.	

Category 1: Habitat Management and Restoration: Improvement of Summer and Winter Rearing Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-1-2c	Tier 2	Near-term	Install systems that treat warm water or percolate it through the ground to cool it. (See also WUE-7b)	Wolford Slough demonstration project to percolate warm water back through groundwater. Summer 2003.	NRCS/ SRWC/ RCD	Seek funding and carry out projects where appropriate.		
Scott HM-1-2d	Tier 2	Near-term	Model the relationship of temperature and flow and use the results to plan the timing and locations of water additions to the river.	Flow gauges are presently installed in the Scott River; some temperature data have been collected and analyzed. Under the TMDL process, a flow/ temperature model for the Scott is being developed.	DFG RCD SRWC	Fund and implement temperature studies. Coordinate with the NCRWQCB TMDL process in data collection.	Monitor projects to determine optimum benefits are achieved with implementation of habitat improvement actions.	

Category 2: Habitat Management and Restoration: Improve Valley and Low-gradient Tributary Channel Structure and Function

Issue: Degraded Channel Structure and Function. Historical accounts indicate that in the early 1900s the Scott River in the valley was narrow and deep (with more of a meander pattern) and was more in contact with its floodplain. Today the river is currently a mix of reaches, some are narrow and riprapped, while others are broad and wide. Channel recovery is impeded. Most reaches illustrate large width to depth ratios. This fact, combined with summer low flows and minimal riparian shading, lead to very warm stream temperatures during the summer months.
In other reaches, down-cut channel conditions, loss of meander pattern, and increased stream gradient all translate to increased amounts of stream flow (stream power) held within the channel during larger flows resulting in increases streambank erosion and the need for riprap. Down-cut channels also act as drains to surrounding land resulting in a lowering of the water table. This has ramifications on water storage, riparian vegetation and streambank stabilization.

Solution: Restore valley river structure to an appropriate meander pattern, decreased channel slope, decreased width-to-depth ratios, proper connections with the floodplain and side channels, where feasible.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Importance	Timing						
Scott HM-2a	Tier 2	Near-term	Evaluate the geomorphology of the Scott River system. Identify all areas of high width-to-depth ratios, with entrenched channels, or other compromised areas. . Implement projects that improve stream geomorphology at specific locations in conjunction with system-wide stream channel improvement. Identify and apply consistently a system of stream classification.	RCD is doing habitat typing. The TMDL process will be mapping stream geomorphology.	DFG SRWC RCD	Need expert input – understand fluvial processes and formulate plan of recovery. Map areas of unstable banks, high width-to-depth ratios, or entrenched channels. Develop a Request for Proposals for stream channel restoration projects that are based in natural process restoration.	Implement a long-term monitoring program to assess responses to implemented restoration projects, with monitoring sites established to measure, for example, cross-sectional channel profile, substrate composition, streambank condition (including riparian vegetation), and photo points.	

Category 2: Habitat Management and Restoration: Improve Valley and Low-gradient Tributary Channel Structure and Function (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-2b	Tier 2	Medium	Identify locations where the main channel can be reconnected to its floodplain and historic sloughs to allow formation of side channels without negative impacts to the community. Implementation of this recommendation should be done after remediation of the Callahan Dredger Tailings.	Off channel habitat is found primarily in low-gradient (<2%??), alluvial channels. These would include significant portions of the mainstem Scott and lower portions of major tributaries (e.g., Sugar, French, Etna, Patterson, Kidder, Moffett, and Shackleford creeks). NRCS has a conservation reserve program (RR/CRP) that compensates for special management purposes to achieve resource goal for recovery. Landowners can be paid for participating in a setback program.	SRWC RCD	Assess the feasibility of setback levees to restore channel function. Survey with funding. Prioritize projects and solicit buy-in. Utilize information from habitat studies above to select locations for the best cost/benefit to coho.	Implement projects as appropriate. Include appropriate monitoring of this effort.)	

Category 2: Habitat Management and Restoration: Improve Valley and Low-gradient Tributary Channel Structure and Function (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-2c	Tier 1	Medium	Restore the Scott River floodplain in the Callahan Dredger Tailings reach, through a community-driven process supported by the SRWC.	The USFWS environmental compliance data gathering will sample for mercury contamination in the dredger tailings in Summer 2003.	SRWC RCD DFG Siskiyou County	Review Tom Hesseldenz and Associates report to USFWS. Secure funding to establish a stakeholder group (including agencies and design consultants) to formulate a process and plan to restore the tailings.	Secure funding and implement tailings restoration.	

Category 3: Habitat Management and Restoration: Barriers to Fish Passage

Issue: Juvenile coho need access to rearing habitat that is suitable at different times of the year, however natural and other barriers may prevent them from moving freely. Barriers to juvenile fish movement are found where streamflow goes sub-surface and where impediments in the channel block fish passage. Some barriers are the result of human activity and have the potential of being remedied.
Coho spawners return to the Scott River in November, making their way up through the canyon to spawning grounds. Particularly in drought years, natural and other barriers may delay or prevent coho from reaching spawning areas. Barriers to movement are found where streamflow goes sub-surface and where impediments in the channel block fish passage. Some barriers are the result of human activity and have the potential to be remedied.

Solution: Continue to investigate and implement fish passage improvement projects and promote the surface connectivity of streams that provide coho habitat.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Importance	Timing						
Scott HM-3a	Tier 1	Near-term	Identify location, timing, duration and frequency of low flows that prevent juvenile access to rearing habitats.	This information likely exists, but has not been compiled.	DFG	Compile information and incorporate into a GIS.	Implement actions to remediate barriers.	
Scott HM-3b	Tier 4	Medium	Identify, prioritize, and treat barriers on private roads, consistent with the Five Counties process for road assessments. Comply with DFG-NOAA Fisheries.	No assessments have been done.	SRWC RCD	Prioritize projects for benefit to coho and implement with completion dates in the near term (1-3 years).	Implement actions to remediate barriers.	

Category 3: Habitat Management and Restoration: Barriers to Fish Passage (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-3c	Tier 2	Near-term	Investigate opportunities to construct low-flow channels through alluvial fans to improve fish passage (short- and long-term) in all tributaries from French Creek north.	Annual barriers may exist in aggraded reaches; data have not been compiled.	DFG	Compile data describing where barriers are found. Secure funding to formulate a process and plan to restore the aggraded reaches.	Secure funding and implement restoration.	

Category 4: Habitat Management and Restoration: Improvement of Spawning Habitat								
Issue: Spawning coho require gravel with rocks within a particular size range. They prefer spawning locations with adequate habitat complexity to prevent redds from washing out in floods and provide cover nearby for emerging fry. Moffett Creek has a high sediment load, can run turbid, and contributes a large amount of fine-grained sediment to the Scott River. Large pools in the Canyon Area are reduced in volume due to granitic sand loading. In other locations, aggradations of larger cobbles and boulders have covered or replaced spawning gravels. Erosion from mining tailings affects many tributaries from the South Fork to Scott Bar.								
Solutions: Identify and conserve existing spawning habitat. Restore lost spawning habitat where possible. In locations where there are problems, increase habitat complexity and gravel quality.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-4a	Tier 1	Near-term	Identify existing coho spawning habitat. Study the habitat needs of spawning coho in the Scott River watershed. Protect and maintain spawning habitat to prevent further loss of the species.	On-going spawner surveys conducted in 2001-2002-2003.	CDFG SRWC RCD USFS	Secure funding. Continue and expand existing surveys. Quantify spawning habitat. Use this information to prioritize projects for habitat restoration and enhancement	Continue to use results to plan projects and drive adaptive management.	

Category 4: Habitat Management and Restoration: Improvement of Spawning Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Scott HM-4b	Tier 3	Medium	Improve spawning gravel quantity and quality.		CDFG SRWC RCD	Develop a sediment budget; identify locations with an action plan for desired future conditions; and determine and remediate causes of aggradation. Identify locations that have poor quality or lack adequate spawning gravels but in other respects meet coho spawning requirements. Remove fine sediment from gravels in locations that otherwise meet coho spawning requirements but where gravels are buried. Remove large, aggraded rock from locations that otherwise meet coho spawning requirements but where gravels are buried. Assess gravel recruitment and augmentation locations	Design, secure funding, and implement projects.	
Scott HM-4c	Tier 4	Near-term	Identify and remedy sources of fine sediment within the SSRT area.	Sediment studies were conducted by Sari Sommarstrom (1989 and 2000).	SRWC RCD DFG	Secure funding and conduct surveys. Use this information to implement projects to reduce sediment input.	Continue as needed.	

Shasta-Scott Recovery Team Recommendations for Recovery of Coho Salmon

3b. Habitat Management and Restoration - Shasta Valley

Area: Klamath River Hydrologic Unit: Shasta Valley Hydrologic Subarea (HSA)								
Category: Habitat Management and Restoration: Improvement of Rearing Habitat								
Issues: Inaccessibility to tributaries, high stream temperatures, and lack of habitat complexity limit coho production within the Shasta River.								
Solutions: In the short-term identify and maintain existing spawning and rearing habitats. In the long term, create multiple refugia areas, and/or re-link those no longer accessible. Establish recovery goals.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Shasta HM-1a	Tier 1	Near-term	Identify existing areas successfully used for rearing and potential rearing areas by conducting entire mainstem channel-length survey: 1) water temperature/refugia; and 2) habitat suitability based on slope and water velocity. Estimate carrying capacity and fish utilization of rearing habitat. Identify spawning areas and determine accessibility to rearing areas.	Data do not exist or are inadequate.	DFG RCD CRMP	Secure funding, conduct habitat, spawning, and rearing surveys, and prepare analysis.	Use results to guide and prioritize projects to insure best benefit to coho and overall restoration of the river.	

Category: Habitat Management and Restoration: Improvement of Rearing Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
Shasta HM-1b	Tier 2	Near-term	Implement habitat protection, restoration, and improvement projects that enhance rearing habitat in high priority areas.	Little Shasta River and Parks, Eddy, Dale, Boles, Beaughton, Carrick, and Yreka creeks have been identified as possible key areas.	DFG RCD CRMP	Focus on areas currently accessible or potentially accessible to coho i.e. below Greenhorn and Dwinnell Dams. Conduct habitat suitability studies (see also Shasta HM-1a) on other streams to guide future actions. Coordinate with long-range planning effort for addressing barriers (Shasta HM-2). Possible projects to include are livestock control or exclusion fencing, tree and emergent planting, bioengineered bank stabilization, and irrigation tailwater reduction.	Continue projects. Monitor for effectiveness over the long term, utilizing adaptive management to fine-tune projects for best benefit to coho salmon.	

Category: Habitat Management and Restoration: Barriers to Fish Passage

Issues: Issue: Juvenile coho need access to rearing habitat that is suitable at different times of the year, however natural and other barriers may prevent them from moving freely. Barriers to juvenile fish movement are found where streamflow goes sub-surface and where impediments in the channel block fish passage. Some barriers are the result of human activity and have the potential of being remedied.
Coho spawners return to the Shasta River in November, making their way up through the canyon to spawning grounds. Particularly in drought years, natural and other barriers may delay or prevent coho from reaching spawning areas. Barriers to movement are found where streamflow goes sub-surface and where impediments in the channel block fish passage. Some barriers are the result of human activity and have the potential to be remedied.

Solutions: Continue to investigate and implement fish passage improvement projects and promote the surface connectivity of streams that provide coho habitat.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Importance	Timing						
Shasta HM-2a	Tier 1	Near-term	Identify barriers to fish passage throughout the watershed for adults and juveniles, and work to implement solutions to these barriers.	For some life stages at some times of year on the mainstem Shasta River, six instream flashboard dams present partial or complete blockages to passage.	DFG RCD CRMP	At each site assess impacts on water quality and assess importance for coho passage at each site. Assign each dam/impoundment a priority for reduction or removal. Work with users to select workable management measures. Implement short term solutions and work towards removal or remediation of passage problems at flashboard dams as soon as possible where feasible; otherwise develop temporary modifications to minimize passage and water quality problems.	Implement removal or remediation of passage problems at flashboard dams where feasible, otherwise modify to minimize passage and water quality problems. Continue to work with affected landowners and implement workable solution. Refine and Implement long-term solutions.	
Shasta HM-2b	Tier 3	Medium	Same as Shasta HM-2a	Dwinnell and Greenhorn dams are year-around barriers.	DFG RCD CRMP	Develop working group to create long-range strategy for Greenhorn and Dwinnell, including assessment of suitability of habitat upstream, options for passage or modification/removal.	Develop a long-term solution and implement that if it is different from short-term outcome.	

Category: Habitat Management and Restoration: Barriers to Fish Passage (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Impor-tance	**Timing**						
Shasta HM-2c	Tier 1	Near-term	Same as Shasta HM-2a	Impoundment at Highway 3 presents known water quality barrier due to low D.O. at times, (No information on water quality at other sites.)	DFG RCD CRMP	Provide for passage at Highway 3 as soon as possible; determine impacts on water quality, if any, at all sites.	Develop a plan for complete removal if possible. Implement TMDL plans.	
Shasta HM-2d	Tier 1	Near-term	Same as Shasta HM-2a	Impoundment upstream of A-12 blocks access to only significant cold water area of any size during the summer months.	DFG RCD CRMP	Provide for passage above A-12 to Big Springs refugia area as soon as possible. Determine impacts on water quality, if any.	Develop a plan for complete removal if possible.	
Shasta HM-2e	Tier 2	On-going	Same as Shasta HM-2a	High temperatures present barriers throughout river.	DFG RCD CRMP	Work with Shasta Temperature model and through TMDL process to establish appropriate targets based on system capability. Provide for passage to safe areas in the short term.		
Shasta HM-2f	Tier 1	On-going	Same as Shasta HM-2a	Parks Creek has been identified to have barriers at the I-5 crossing and at one diversion downstream.	DFG RCD CRMP	Studies/repairs underway. Continue to completion.	Monitor for management, maintenance and effectiveness.	
Shasta HM-2g	Tier 1	Near-term	Same as Shasta HM-2a See WM-9 for flow recommen-dations.	Both Parks Creek and Little Shasta are dewatered in places creating barriers.	DFG RCD CRMP	Develop target initial instream flows to re-water channel year-round.	Purchase or lease water. Assess appropriateness of flow tested. Adjust.	

Category: Habitat Management and Restoration: Barriers to Fish Passage (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Impor-tance	**Timing**						
Shasta HM-2h	Tier 1	On-going	Same as Shasta HM-2a	Two diversion dams on Little Shasta block fish passage to refugia areas. Modifications scheduled by DFG for one of these dams.	DFG RCD CRMP	Develop a plan for the second and seek funding.	Implement barrier modification on second barrier.	
Shasta HM-2i	Tier 3	On-going	Same as Shasta HM-2a	Inventory of road barriers to fish passage within coho habitat is complete.	DFG RCD CRMP	Implement results of on-going study of road barriers on Parks Creek.		

Category: Habitat Management and Restoration: Spawning Gravel Management

Issues: In the Shasta River, severe limits on spawning gravel exist below Dwinnell Dam due to natural geological conditions. Historic in-channel gravel mining in the mainstem, gold mining in Yreka Creek and its subsequent channelization, and the construction of Greenhorn Dam exacerbated that shortage. Greenhorn Dam also blocks the input of gravel to Yreka Creek and Shasta Canyon. Those natural geologic conditions (the filling of the Shasta Valley with volcanic debris approximately 300,000 years ago) make coarse-sediment supply in the Shasta extremely limited and present coarse-sediment transport conditions that probably exist nowhere else on earth.
Under current conditions, existing spawning gravel has essentially no way of cleansing or replacing itself, leading to higher mortality of eggs in gravels. Presence of Dwinnell Dam limits peak flows that historically cleaned gravels. Remnant gravels may have substantially less capacity for fine sediment than natural conditions once allowed, due to lack of periodic removal of fines.

Solutions: Improve spawning gravel quality and quantity and reduce input of fine sediment.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Importance	Timing						
Shasta HM-3a	Tier 1	Near-term	Prepare a gravel budget for the watershed.	The problem is identified and well known. Funding to quantify extent of problem and develop management plan sought unsuccessfully to date.	RCD CRMP	Continuing to submit funding request for study. The gravel budget study will guide implementation of all recommendations in this section. Use this information to develop projects to benefit coho spawning, secure funding, and implement.	Monitor Continue implementation of plan as hydrologic conditions dictate.	
Shasta HM-3b	Tier 2	Medium	Determine natural processes that historically maintained spawning gravel. Identify methods of restoring quantity and quality of gravel.	Continuing to submit funding request for study.	RCD CRMP	Conduct gravel budget study and apply results of study to needs of coho.	Re-create historic process if feasible; mitigate if not. Artificial supplementation may be necessary due to loss of natural processes and historic removal.	

Category: Habitat Management and Restoration: Spawning Gravel Management (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Shasta HM-3c	Tier 2	Medium	Identify and map existing and potential spawning gravel locations and sources of gravel. Evaluate suitability for spawning and access to rearing areas for emergent fry.	1980 DWR study provides initial data.	RCD CRMP	Conduct Gravel Budget study and apply results of study to needs of coho.	Monitor condition over time and continue to apply results of the study.	
Shasta HM-3d	Tier 2	Medium	Identify and quantify sources of fine sediment and mitigate their effect on spawning gravel quality.	Fine sediment greatly impacts gravel quality in all sites that have been investigated (Jong 1995). Identified problem being partially addressed by riparian restoration measures.	RCD CRMP	Accelerate restoration measures, especially livestock exclusion fencing and emergent plantings. Investigate role and importance of spawning salmon in maintaining gravel cleanliness under the unique conditions found in the Shasta River.	Establish basin-wide monitoring program to chart changes over time in fine sediment. Develop fine sediment budget for the river. Assess status. Integrate fine sediment problem into long-range planning for Dwinnell Dam, potential use of flushing flows to maintain habitat, and establishing instream flow needs.	

Category: Habitat Management and Restoration: Riparian Vegetation Management

Issues: Riparian vegetation is an important element supporting juvenile rearing habitat for coho. Riparian trees shade streams, reducing solar heating of the water, provide woody debris, and drop insects and debris that contribute to the food supply. In the Shasta River vegetation has been reduced for a variety of reasons.
Substantial restoration efforts have focused on livestock exclusion fencing and riparian planting, and much has been accomplished in those areas, but significant problems have been discovered that limit the ability to re-create riparian cover.

Solutions: Increase riparian vegetation.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Importance	Timing						
Shasta HM-4a	Tier 3	On-going	Encourage riparian restoration projects using locally native vegetation including both woody and herbaceous stocks. Project implementation should consider if: 1) the site previously supported riparian vegetation and still has the soil and hydrologic characteristics to support it; 2) the native plants selected are likely to flourish; 3) the width of the planted riparian zone is appropriate for the hydrologic regime at the site; and 4) the plan includes effectiveness monitoring using approved protocols.	On-going and expanding	RCD CRMP	Continue riparian planting efforts. Identify natural processes that encourage riparian vegetation recruitment. Establish working relationship/MOU with entities such as U.C. Davis, Humboldt State University, USFS, NRCS, Society for Ecological Restoration, etc. to investigate specifics, test alternatives, and develop broad adaptive management approach. Evaluate outcomes of replanting and research causes of riparian planting outcomes, appropriate width of planted areas, and new strategies for restoration.	Continue	

Category: Habitat Management and Restoration: Riparian Vegetation Management (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
Shasta HM-4b	Tier 3	Medium	Establish procedures for recommending appropriate plant materials where natural conditions are significantly compromised and local species are not likely to thrive	Local native plants used exclusively to date in CRMP projects. Sources for plantings for other projects are unknown. Some failures in historically suitable sites believed due to changes in soil conditions over time. Changes observed include lack of bare sand/gravel typical of post flood, build-up of anaerobic conditions in soils, change in natural hydrograph limiting seedling survival.	DFG CRMP RCD	Do search for information on similar conditions elsewhere. Where undocumented, or where realistic remediation does not exist, prepare presentation materials for publication and discussion at restoration conferences. (See EO-8.) Seek to establish a working group from industry, academia and government to identify specific problem conditions, determine if they can be reduced, or suggest alternative species compatible with local conditions if they cannot be remediated.	Coordinate this discussion with considerations on instream flows, future role of Dwinnell Dam, TMDL temperature targets, fine sediment monitoring in spawning gravels.	

Category: Habitat Management and Restoration: Riparian Vegetation Management (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
HM-4c See also EO-9	Tier 4	Medium	Educate non-agricultural landowners on the importance of not removing riparian vegetation.	Discussed, no actions taken as yet		Prepare presentation materials with photos, illustrating desired future condition. Create awards and recognition. Since this is primarily an urban problem, work closely with Yreka Creek Committee to develop approach.	Secure ongoing funding for periodic reminders and recognition.	
Shasta HM-4d	Tier 3	Medium	Investigate the establishment of a riparian easement or lease program to compensate landowners for short-term or long-term protection of their riparian property.	The NRCS Riparian Reserve /Conservation Reserve Program has been successfully implemented. The County has a concern about the conversion of private property to public ownership.	RCD	Create opportunity, then gauge acceptability of program from local landowners response. Review the Buckhorn Conservancy. Find or develop a local entity or process to implement program.	Monitor; utilize adaptive management of program.	

Category: Habitat Management and Restoration: Water Temperature

Issues: Water temperatures are influenced by amount of river flow, and river structure (W/D ratios, etc.) air temperature, shading from terrain and vegetation, influx of groundwater, tributary flow and runoff, and other factors. Water temperature is listed as a significant problem for the Shasta River (303d impaired). High water temperatures can stress coho, increasing disease and mortality.

Solutions: Address factors that contribute to high water temperatures. Modeling water temperature and flow relationships in the mainstem will help plan for water management and habitat restoration in the river.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Importance	Timing						
Shasta HM-5a	Tier 1	On-going	Continue to model the relationship of temperature and flow. Use that information and other habitat variables to plan for water management and habitat restoration in the river.	Dr. Michael Deas has completed the fundamental model for temperature and flow for the mainstem Shasta River below Dwinnell Dam by.	DFG RCD CRMP	Fund development of more scenarios to cover a broader array of flows to run through the model. Coordinate with the NCRWQCB in TMDL process.	Use model result to target restoration projects. Expand model to include the rest of the watershed.	
Shasta HM-5b	Tier 2	Medium	Identify location, timing, frequency and duration of thermal barriers to migration for adult and juvenile coho salmon. Develop habitat improvement measures that address temperature.	Identification already done on the mainstem; investigate details on tributaries.	DFG	Identify and map locations and timing of thermal barriers. Coordinate information and projects to address appropriate solutions in prioritized areas with the most benefit to coho salmon.	Implement projects or measures in coordination with over-all habitat recovery process and monitor for improvements in an adaptive fashion.	

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4. Water Use Efficiency

Overall Goals:

- Promote water conservation by all water users (both for irrigation and stock water), particularly ***during low-flow years.***
- Promote and assure leaving water savings in the streams.
- Prioritize projects by recognized benefit to coho salmon; conduct cost-benefit analyses, including analysis of watershed volume and the effectiveness of the efficiency program for benefits to coho.
- Research and promote incentives for the efficient use of water, including tax incentives.

Area: Klamath River Hydrologic Unit: **Scott River Hydrologic Area (HA) and Shasta Valley Hydrologic Subarea (HSA)**

Category: Water Use Efficiency: Stock Water Alternatives

Issues: Active surface diversion for livestock watering in the post-irrigation season may reduce instream flows at a critical time for migrating adult coho salmon.

Solutions: Provide and maintain alternate stock watering facilities through voluntary, incentive-based programs.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cost
	Import-ance	Timing						
WU E-1a	Tier 4	Medium	Develop the cost and potential stream-flow enhancement if all relevant diversions participated.	Potential benefits are greater in the Scott River.	SRWC RCD CRMP	Coordinate with implementation of WUE-1b.		
WU E-1b	Tier 3	Medium	Where water losses appear to be significant or where associated benefits can be demonstrated for coho (e.g., fencing of riparian areas), identify and provide alternative stock water systems.	Some systems in place in both valleys.	SRWC RCD CRMP	Identify and reprioritize systems needed by Dec 31, 2003. Design approach to individual systems; seek funding.	Install selected systems by Sept. 30, 2007.	$7-9K per average individua l system

Category: Water Use Efficiency: Stock Water Alternatives (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
WUE -1c	Tier 4	Medium	Provide improved awareness of needs for fish protection through the non-irrigation season and provide information about costs and benefits of stock-watering alternatives. [1]		SRWC RCD CRMP	Provide education about management changes under ESA.		Modest

Category: Water Use Efficiency: Landowner Workshops								
Issues: Water users may lack awareness about the advantages and methods of water use efficiency, including alternate stock-watering methods.								
Solutions: Educate water users and develop incentives for their participation in water-use efficiency programs.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importa nce	**Timing**						
WUE-2	Tier 3	Medium	Promote and provide landowner workshops. Work with landowners to develop a method to prioritize efficiency improvements that will yield either increased instream flows or improved water quality. Use to avoid funding projects that would not benefit coho. See also EO-2.		SRWC RCD CRMP	Evaluate and provide education as appropriate.		

[1] Realization that fish screens must operate at all times when diverting water (paddle wheel and screens ice up in winter and self destruct) will make efficient livestock watering systems look pretty good. Biggest failure is frost damage and ill thought out tank placement. Once valve freezes or pipe splits, they don't get fixed. This has driven the cost way up**.** Might be worth documenting causes of failure in order to either upgrade or avoid in future designs. Over the years this problem became in part a justification for removing screens when they would do the most good—when newly emerged fish are in the water column, but also when the risk of damage is greatest (a typical mechanics response to a biological problem—protect the machine) and as a result no effort was made to solve it. There may be a need for a little innovation to take advantage of the fact that liquid water contains a great deal of heat, and that something as simple as an insulated cover might be sufficient to reduce evaporation and trap heat to keep the temperature above freezing, or if not that alone possibly in combination with cups to carry up more water and dump it over the wheel and/or screen to facilitate the heat transfer.

Category: Water Use Efficiency: Ditch Lining and Piping								
Issues: Water losses from surface ditch systems may lead to more water being diverted than is needed at the point of use. [2]								
Solutions: Identify the advantages and water savings of lining and or piping surface ditch systems. Identify and prioritize ditch systems that have potential water saving benefits to coho. Research possible negative effects to habitat, wildlife, and aquifer recharge from lining and or piping ditches.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-3	Tier 3	On-going	Identify water savings from lining and/or piping surface ditch systems. Identify and prioritize ditch systems that have potential water-saving benefits to coho salmon. Develop locally specific policies and provide guidance to entities that fund and review these projects. Evaluate potential negative impacts to groundwater, wildlife, and other resources that could result from lining or piping ditch systems. If appropriate, concurrently implement companion planned winter recharge program to maintain system balance.	Sugar Creek piping project in Scott Valley is in progress and should provide monitoring potential for future projects. In Shasta, Montague Irrigation District has ongoing canal lining program. Other ditches in basin repaired mainly on an emergency basis. NRCS provides on-going funding for pipelining projects for individual landowners in both basins, so the process is done in piecemeal fashion and without consideration to groundwater impacts.	SRWC CRMP RCD NRCS	Map all existing ditches, show season of use, quantity, and determine ditch loss. Prioritize potential ditch lining projects. Collect field data if needed. Consider opportunity for assured, measurable increase in quantity and duration instream flows in spring and fall relative to coho needs for passage, other criteria as developed. Utilize outreach funds to develop appropriate lining projects, especially on shared ditches. Implement where costs, benefits and overall basin priorities coincide.	Continue implementation of high priority projects.	Very high

[2] Additional Considerations: One or more ditches in the Shasta run continuously all summer, even though the demand doesn't seem to be continuous. Turning them off takes too long (driving time), especially when combined with the time required to re-fill the ditch.

Some ditches in the Scott continue to divert water even though it is not getting to point of use. Users don't take out diversion dams as they are waiting for flows to increase in the fall for stock water. This is not a beneficial use of water and flows should be returned to the stream. It may be possible to return 5-7 cfs to the streams under this scenario for no cost. This is where water verification system is needed.

Category: Water Use Efficiency: Ditch Repair and Cleaning								
Issues: Lack of ditch maintenance can cause sustained high diversion rates and resulting flow impacts to coho salmon.								
Solutions: Promote routine and on-going ditch maintenance. Research funding opportunities and incentives for ditch repair and cleaning.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-4	Tier 4	Medium	Promote routine and on-going ditch maintenance for ditches in active use.[3] See also EO-2	Many ditches in both watersheds are in poor condition.	DWR Land-owners	Educate landowners about the importance of maintaining ditch in active use and the possible need for access for maintenance activities.	Continue education. Discuss purchase of water right if its beneficial use will not support the cost of maintaining its delivery system.	

[3] Cleaning an unmanaged ditch that gains riparian and aquatic values may require a 1603 agreement. A well maintained ditch will not develop such values and no permit is likely to be required. The maintenance of a ditch is up to the user. This should not be a burden of the State unless there is mutual benefit through a material change (lining or piping coupled with dedication of portion of the net water to the stream). This may be the most effective way to retire water rights in the future. Certainly a poor cost-benefit ratio has had that effect in the past.

Category: Water Use Efficiency: Irrigation System Efficiency								
Issues: Inefficient irrigation systems cause loss of water and potential impacts to both flow and water quality.								
Solutions: Promote incentives for irrigators to upgrade and maintain the efficiency of existing irrigation systems where there is a benefit to coho salmon.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-5a	Tier 3	On-going	Evaluate irrigation systems for water use efficiency with assistance from UC Extension Service, NRCS Farm Irrigation Rating Index Model (FIRI) or other available resources. {Flood vs. wheel lines vs. pivots and conversion to low-pressure sprinkler systems}	Limited efforts underway, in both valleys.	RCD NRCS RWQ SRWC CRMP UC Ext	Develop prioritization approach for possible projects. Consider soil type, impacts on water quantity and quality, measurable benefits to coho in terms of instream flow or water quality improvement.	Implement projects only where benefits to coho can be demonstrated and secured.	
WUE-5b	Tier 4	On-going	Promote maintenance of existing sprinkler systems, such as: replacing gaskets and drains; replacing nozzles and/or heads with crop-specific equipment.		SRWC CRMP RCD UC Ext NRCS	Implement education program through UC Extension.		

Category: Water Use Efficiency: Irrigation System Efficiency (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-5c	Tier 4	On-going	Develop/disseminate BMPs for each irrigation type (including land leveling) and a corresponding on-farm monitoring system that is easily useable by farmer (i.e. moisture sensors to verify BMP). Encourage UC Extension to serve as a clearinghouse for the data and to evaluate success of the program.	Moisture sensors have been placed on some fields in both valleys.	UC Ext NRCS			
WUE-5d	Tier 3	Medium	Review existing water delivery pricing arrangements within irrigation districts to see if they are as effective as possible at encouraging efficient use of water.	Four districts in Shasta Valley each have different billing arrangements; similarly, there is one in the Scott Valley. This effort is partially initiated in one district in the Shasta Valley	NRCS UC Ext	Conduct an economic study to look at current pricing systems, suggest revenue neutral changes that would enhance conservation and/or dedication to instream flows. Present to each district for consideration and possible action.		Low

Category: Water Use Efficiency: Irrigation System Efficiency (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-5e	Tier 4	On-going	Support DWR in implementing the California Irrigation Management Information System (CIMIS) stations that measure evapotranspiration information and make it available over the internet to aid farmers in efficiently irrigating.	DWR plans to install stations in each valley summer 2003. Site in Shasta selected. This system may not be practical for irrigation scheduling in alfalfa and pasture.	DWR	Site and install stations, take steps to make information available to irrigators. Hold training programs to show utility.		

Category: Water Use Efficiency: Cropping Changes								
Issues: Lack of stream flows influenced by diversion can impact coho habitat. Certain crops or practices may not be the most efficient use of water.								
Solutions: Research and suggest voluntary changes in cropping or practices that reduce water consumption and / or improve yield.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE -6a	Tier 3	Medium	Research and suggest voluntary cropping changes that reduce water consumption and / or improve yield.	There are very few crop alternatives for this climate and soils. Growers are always looking for higher value, more water-use efficient crops, so there may be very little potential for this recommendation. This needs to be addressed in a comprehensive fashion so that real opportunities can be pursued, and false hopes abandoned. Possibly the only real opportunity is to subsidize farmers for planting a crop that uses less water but makes less money. (See page 22 in Putnam et al. 2001 for a discussion of this issue.)	UC Ext NRCS	Prepare a document reviewing all known crops capable of being grown commercially in this area, showing yield/acre likely, current market price, water requirements, growing season. For any that look promising in terms of water consumption, do further assessment of barriers to their use, including difference in return per acre vs. existing crops, marketing hurdles, processing hurdles, equipment processing and storage hurdles, and market limitations.	Implement if feasible. Periodically review and update crop review document. If deemed feasible, partner with other producers throughout the watershed as appropriate; establish guidelines verification and marketing processes. If mechanical barriers are identified to otherwise promising potential changes, develop plan to address those hurdles if local producers can be encouraged to show interest. Where barriers are primarily economic, develop an approach that could subsidize conversion by willing producers.	

Category: Water Use Efficiency: Cropping Changes (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-6b	Tier 3	Near-term	Seek more marketing assistance and begin investigation of promoting local processing plants, thereby allowing people to transition to lower water use crops and to gain more income from value added options. Investigate opportunities to embark on strategy of "salmon safe" product marketing as a way to boost value of otherwise economically non-competitive crops or growing procedures.	A beef marketing group has been formed to develop a niche market for local, grass-fed beef and a mobile processing plant.	EDC, County, Farm Bureau, Farm Extension	Seek needed assistance; develop a plan to promote project; implement with County support; investigate RAC funding for processing plant options. If deemed feasible, partner with other producers throughout the watershed as appropriate; establish guidelines verification and marketing processes.		

Category: Water Use Efficiency: Cropping Changes (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-6c	Tier 3	Near-term	Launch a project to take advantage of changing opportunities in the beef industry for niche markets, which can provide greater financial returns and possible water savings as a result of the value-added option.	American Farmland Trust has a niche beef production project in Colorado. Niche markets include certified, organic, natural (no artificial ingredients and minimal processing), grass-fed (little or no grain finishing), locally raised (promotes local business), and conservation-based (animals raised on land protected according to certain stewardship practices).	UC Coop Extension, USDA field personnel, State agriculture, RCDs, SRWC, CRMP, County Economic Development Council	Develop a workshop model that addresses risk involved in starting a niche-oriented business; production flow and related issues; product marketing; pricing; applicable State and federal regulations. Proceed with implementing workshops and making available marketing and other support to carry out the program.	Implement this project concurrently with efforts to establish local processing plants.	

Category: Water Use Efficiency: Tailwater Reclamation								
Issues: Tailwater (agricultural runoff) may negatively impact coho and coho habitat by returning water that is nutrient rich and/or high temperature.								
Solutions: Tailwater return systems can provide beneficial impacts and water conservation opportunities. [4]								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-7a	Tier 1	Near-term	Conduct basin-wide assessment of irrigation practices to identify opportunities to improve water use efficiency in order to reduce tailwater creation. Identify areas of tailwater inputs that cannot be reduced by improved irrigation practices.	Under discussion on basin-wide basis with NRCS, being implemented on individual basis by NRCS and CRMP. Tailwater systems are not needed with sprinkler systems.	RCD SRWC CRMP	Conduct assessment. Coordinate with TMDL process	Prioritize remedial measures identified in assessment	

[4] Tailwater capture and reuse projects should only be done after reasonable measures have been taken to minimize its creation in the first place, information has been gathered to quantify magnitude of problem to be solved to assure cost effectiveness of individual project, and adequate assurances are in place to prevent further dewatering of the system as a whole, since there is an inherent risk of trading improvements in water quality for losses in water quantity if new land is irrigated with the tailwater, or existing irrigated ground is irrigated more than it previously had been.

Establish prioritization process and guidelines to direct future funding from all agency sources toward those projects that accomplish water quality improvements only where protection is included to assure that it will not be done by sacrificing instream flows, there-by jeopardizing other users and fish.

Reductions in tailwater may contribute to dewatering of system if new land is irrigated.)

Efficiency measures may not yield benefits in terms of water quantity if losses are currently either returning to the system, or are used by others who would shift to other surface sources if tailwater were eliminated.

Efficiency measures may not improve quality if tailwater does not reach the stream.

Category: Water Use Efficiency: Tailwater Reclamation (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WUE-7b	Tier 2	On-going	Research and promote methods and opportunities to first minimize and then reclaim tailwater where it can be justified and is legally permissible. Priority should be given to shared systems.	This effort has been on-going, especially in the Shasta Valley, for many years. In summer 2003, the Wolford Slough demonstration project in the Scott Valley will percolate warm tailwater back through groundwater, rather than returning it directly to the stream.	NRCS RCD	Provide agricultural engineering assistance to evaluate irrigation practices, soil depth, costs, and other factors that affect creation of tailwater on a ranch-by-ranch basis. Provide an agricultural waiver to eliminate red tape and permitting hurdles that currently block construction of tailwater systems, while retaining assurances that conditions will not be made worse by system proposed. Formalize local review group and process to assure cost effectiveness and prevent collateral damage	Develop more comprehensive plans to capture and re-use tailwater as efficiently as possible. I.e. possibly build larger systems addressing multiple owners, rather than a cascade of individual ponds.	
WUE-7c	Tier 4	Near-term	Develop a comprehensive evaluation and ranking process to be adopted by funding sources to maximize benefits to coho while minimizing negative impacts possible with tailwater management projects.	Legislators, funding agencies, individuals often ill informed on complexity of problem, pursue inappropriate solutions as a consequence.	CRMP DWR NRCS Farm Bureau	Educate funders to understand complexity of this issue via coho process. Strongly advocate the development of a statewide evaluation process to achieve positive cost/benefit ratio with adequate understanding of effects on instream flows before funds are allocated. Same for federally funded projects. Implement	Refine and adaptively manage.	

Category: Water Use Efficiency: Agricultural Water Conservation Best Management Practices								
Issues: Current farm operations may not employ agricultural BMPs.								
Solutions: Develop Agricultural Water Conservation BMPs that meet the needs of local landowners, particular with respect to regulatory issues.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
WU E-8	Tier 3	Medium	Develop Agricultural Water Conservation BMPs.	Many versions of BMPs can be found, but none provide safe harbor or TMDL relief.	UC Ext. NRCS RWQCB DWR	Revive Resource Management Advisory Committee (RMAC)-type planning approach. Get stakeholder agencies (State and Federal) to work with agriculture to develop a BMP/Safe Harbor program.		

References Cited:

Putnam, Dan, Michael Russelle, Steve Orloff, Jim Kuhn, Lee Fitzhugh, Larry Godfrey, Aaron Kiess, and Rachael Long. 2001. *Alfalfa, Wildlife, and the Environment*. Published by California Alfalfa and Forage Association, Novato, California.

Other Reference Materials:

Soil-Moisture Monitoring; A simple method to improve Alfalfa and pasture Irrigation Management, Steve Orloff, Blaine Hanson & Dan Putnam, University of California cooperative Extension and Scott River Watershed Council.

Scott River Fall Flows Action Plan, 1999 Action Plan Update (DRAFT), Scott River Watershed CRMP Council, Coordinated Resource Management Planning.

Scott River Fall Flows Action Plan Accomplishments 1995 to 2003, Scott River Watershed CRMP Council & Siskiyou Resource Conservation District.

Scott Valley Land Use Plan (review for compliance)

Farm Irrigation Rating Index model (FIRI), USDA Natural Resources Conservation Services (NRCS) A uniform & objective evaluation method for planning irrigation water conservation and identifying ground water and surface water pollution potential. Ref; William Gardiner NRCS Yreka, CA.

Shasta-Scott Recovery Team Recommendations for Recovery of Coho Salmon

5. Protection

Area: Klamath River Hydrologic Unit: **Scott River Hydrologic Area (HA) and Shasta Valley Hydrologic Subarea (HSA)**								
Category: Protection								
Issues: Adult coho salmon migrate upstream and spawn during the winter months, juveniles remain (rear) in the mainstem and tributary streams for one full year before they migrate downstream and out of the watersheds. Throughout the course of that year, there are many activities that take place that could minimize the production of coho salmon.								
Solutions: Promote coho salmon recovery by minimizing the potential for entrainment in diversions, protection of riparian vegetation, land use planning and enforcement of existing regulations.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Import-ance	**Timing**						
P-1	Tier 1	Near-term	Screen all diversions in the known and potential range of coho salmon.	In the Scott, most screening will be complete by Winter 2003 in areas of known coho habitat. Some minor diversions in non-rearing areas may be left. Most diversions in the Shasta River are screened except those made newly accessible to coho during 2003-4, Funding secured for screens to be installed.	DFG Local Groups Land Owners	Identify funding and complete on-going screening program within known and potential range of coho. Assess habitat that will be made accessible to coho after completion of scheduled projects. Coordinate between involved Federal and State Agencies, local and private entities to develop a prioritized list of any remaining unscreened diversions and action plans including designs.	Deal with screen maintenance problems. Identify funding and complete ongoing screening program within the known and potential range of coho. Develop protocols for coho trapping and relocation. Establish verification procedures to assure that screens are properly installed and maintained by person(s) benefiting from use of the screened diversion. Support evaluation of and transition to less labor intensive designs to minimize future maintenance.	

Category: Protection (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
P-2	Tier 2	Near-term	Promote and encourage protection of riparian zones that are important for coho through fencing or other measures.	Several programs currently exist that provide incentives for these types of projects. The primary one is NRCS' riparian CREP.	County NRCS Land Owner Local Groups	Identify and continue to develop incentive based programs (i.e. NRCS's CRP) for riparian protection zones. Develop GIS layer for accomplished and needed protection areas. Limit funding to planting of trees from local native stock only. Provide funding for greatly expanded tree re-planting program. Provide protection for remaining large trees along Shasta from beavers. Provide public with visual aids and recognition of achievement of desired future condition. Fund studies to solve regeneration problems as found in Shasta due to altered hydrological cycle and Scott due to drop in groundwater level. All riparian areas within range of coho will be identified and protected within 5 years.	Develop long range riparian protection goals statement and recommendations based on stream meander width (e.g.. Rosgen et al.). Continue to emphasize need to establish/protect/maintain desired conditions. If consequences of altered hydrograph in Shasta cannot be overcome with native trees, investigate and develop biologically appropriate recommendations.	

Category: Protection (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
P-3	Tier 1	Near-term	Expand routine/ daily fish screen maintenance program (volunteer and paid) weather installed with grant funds or by the DFG.	DFG stream improvement headquarters has two new temporary positions. Siskiyou RCD has grant that ends in 6/2004 for two positions. DFG currently provides inspections and maintenance for life on all screens they have built using public funds, but no such inspection and maintenance is available for screens built with grant funds. Limited public funds constrain both new screen construction and maintenance. Shasta CRMP has transferred ownership and maintenance responsibilities to screen owners as the only viable long-term solution.	DFG Land Owners Local Groups	Local groups to work with DFG and NOAA to develop comprehensive maintenance program by 2005. Work with screen users to develop inspection verification procedure for use after transition period. Use time afforded by grant funds to transition away from non-owner screen maintenance and , where appropriate, transfer screen maintenance to the diverter. Prepare maintenance manual, provide part names, numbers and sources, encourage local hardware or farm supply store to stock parts subject to wear, or make arrangements for DFG to stock and sell. Use existing grant-funded personnel to assess existing screens (public and private) to identify all normally replaceable parts used, to modify screens where possible to standardize all parts possible, and prepare hardware lists of replacement parts and number of screens needing each.	Long-term procedure should implement inspection/verification, integrated with verification of water use described in WM-2. Provide periodic on-site training on proper screen maintenance and repair.	

Category: Protection (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
P-4	Tier 1	On-going	Evaluate fish rescue and relocation program. Make improvements if program is viable, and develop steps to minimize the need for rescue and relocation within 5 years.	Currently being reviewed by DFG with a pilot project in French Creek this year.	DFG	DFG develops a fish rescue plan, which will include identification of areas of suitable habitat for all coho life stages, trapping sites, release sites, responsible parties and effectiveness monitoring, or if above requirements cannot be met, sacrifice excess fish. Schedule any additional necessary field surveys, create GIS map of problem areas, assess causes of each, then develop list of actions needed to minimize need for fish rescue.	Work to address problems responsible for bulk of rescue needs.	

Category: Protection (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
P-5	Tier 1	Near-term	Develop construction and removal procedures or alternate means of diverting water for irrigation dams (gravel or flashboard) that minimize impacts to coho salmon.	Section 1603 maintenance agreements require annual removal of diversion structures. DFG and DWR are inspecting dams as time permits Dams in Shasta and Little Shasta assessed; Parks Creek, Ore Slough, Yreka Creek need to be done. Demonstration projects using boulder weirs as an alternative to gravel dams in Scott	DFG Local Groups DWR	Identify locations of existing structures, assess impacts to coho, and recommend improvements to procedures and individual structure design. Work with diverters to implement these improvements. Determine timing of coho emergence. In Shasta, proceed to implementation phase, complete assessments. Eliminate passage problems wherever possible, install or replace ladders where necessary as short term fix. Provide qualified DFG engineer for design assistance in retrofitting barriers with ladders or correcting problems with locally produced and installed ladders as short term, temporary fix. Develop BMPs for removal/ replacement/ operation, include these in 1603 process and monitor for effectiveness for both agriculture and fish.	Work with other agencies to assure that additional barriers are not created in future. Eliminate or reduce passage problems where ladders were used as short-term solutions or mitigation. Fund experimental designs to test approaches under local field conditions.	

Category: Protection (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cost**
	Importance	**Timing**						
P-6	Tier 4	Long-term	Recommend to County to develop agricultural land use policies addressing coho recovery actions, ideas and protections.	Current natural resource policy within the Conservation Element of the General Plan is not specific to coho recovery.	County	Develop agricultural land use policies as appropriate to address coho recovery actions, ideas and protections	Implement County agricultural land use policies as appropriate	
P-7	Tier 1	Near-term8	Recommend enforcement of existing laws, codes, regulations and existing court decrees that are relevant to coho recovery	Current funding does not support adequate enforcement.	DFG County	Support adequate funding of agencies with enforcement authority Develop outreach, information and education program specific to existing laws, codes, regulations and existing court decrees Recommend to local Fish and Game Commission that fines go to recovery restoration efforts	Continue enforcement	

Shasta-Scott Recovery Team Recommendations for Recovery of Coho Salmon

6. Monitoring and Assessment

Area: Klamath River Hydrologic Unit: **Scott River Hydrologic Area (HA) and Shasta Valley Hydrologic Subarea (HSA)**

Category: Monitoring and Assessment: Habitat

Issues: Monitoring and assessment actions are needed in both watersheds to identify and evaluate limiting factors for coho, assist in the prioritization of management alternatives, and evaluate the implementation and effectiveness of individual restoration actions.

Solutions: The SSRT should seek to provide for physical access following acceptable protocols and agreements for community based organizations (SRWC, Shasta CRMP, SOSS) and public agencies (state, federal, local) to conduct monitoring and assessment activities. To maximize the cost effectiveness of monitoring and assessment work, activities in both HSAs should be closely coordinated with ongoing local and regional monitoring programs. Information collected should be grouped and aggregated for public release so that privacy is not violated and made available through web-based linkages and data bases. To evaluate the effectiveness of individual restoration actions, funds should be provided to monitor changes in both habitat parameters and potential response by coho salmon following implementation.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cross References
	Importance	Timing						
MA-1	Tier 3	Near-term	Where agricultural roads have a potential effect on coho, conduct roads inventory and assessments including the location of fish barriers and sediment delivery potential. Monitor physical changes to aquatic resources through time.	No formal inventory completed	Various	Identify and prioritize sediment sources and passage problems for correction.	Implement remediation actions and monitor effectiveness over time.	HM-1b, HM-2e
MA-2	Tier 3	Near-term	Identify and assess riparian vegetation coverage and condition and monitor changes through time.	Partial inventories in past	Local Groups RWQCB	Design and implement assessment and monitoring	Continue implementation	HM-1-1c, HM-3b, HM-3d

Category: Monitoring and Assessment: Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cross References**
	Importance	**Timing**						
MA-3	Tier 1	Near-term	Assess baseline physical habitat conditions including but not limited to channel structure, side channel (including beaver ponds), spawning gravel, riparian vegetation, habitat complexity/connectivity, large woody debris recruitment, and monitor changes in habitat quality and quantity including those associated with restoration activities.	Partial inventories in past and ongoing	Local Groups	Design and implement comprehensive assessment and monitoring incorporating protocols developed in statewide or regional monitoring programs	Continue implementation	HM-1-1e, HM-2-1a, HM-2-1b, HM-4a, HM-4b, HM-2b, HM-2e, HM-3b, P-6 EO-8
MA-4	Tier 1	On-going	Assess water quality/quantity parameters including but not limited to dissolved oxygen, pH, suspended sediment, temperature, turbidity, flow, hyporheic flow, nutrients/pollutants (agricultural return flows, pesticides, herbicides, wastewater) and monitor changes through time. Identify and assess point and non-point pollution sources (e.g., irrigation returns, sediment). Coordinate with the TMDL process	TMDL process underway addressing many but not all of these factors Other data being collected by various agencies but not in a comprehensive fashion	RWQCB Local groups	Design and implement comprehensive assessment and monitoring incorporating protocols developed in statewide or regional monitoring programs	Continue implementation	MA-5; WM-3a, WM-3b, WM-4a, WM-4b, WM-5b, WM-5c, WUE-5a, WUE-7a, HM-1-3b, HM-1-3d, HM-XXX (flow, HM-1b, HM-2e, HM-3b, HM-4a, P-6

Category: Monitoring and Assessment: Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cross References**
	Importance	**Timing**						
MA-5	Tier 1	On-going	Complete inventory and mapping of surface water diversions within the Scott and Shasta Valleys.	Nearing completion	DFG DWR	Complete study including QA/QC	Incorporate into planning process	HM-4a, P-1, P-5
MA-6	Tier 4	Medium	Identify and assess effects of flood control levees on over wintering and other habitat conditions for coho and monitor habitat changes through time.	No assessment to date	Local Groups	Find ACOE and NRCS records of activity for both HAs. Determine effects of levee system.	Determine feasibility; and Develop and implement remediations based on results of assessments	
MA-7	Tier 2	Long-term	Inventory, assess, and monitor effectiveness of water use efficiency/water conservation, water augmentation and water management projects expected to contribute to instream flow.	Some existing monitoring, data have not been analyzed for these purposes.	Local groups NRCS	Design and implement comprehensive monitoring program. Work with DWR to predict effectiveness of the various water use efficiency and conservation practices in both Valleys	Compile results and incorporate into planning	WA-1a, WM-1a, WM-1b, HM-4, WM-2c, WM-2e, WUE-5a, WM-3a, WM-3b, WM-5b, WM-5c

Category: Monitoring and Assessment: Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cross References**
	Importance	**Timing**						
MA-8	Tier 3	On-going	Inventory, assess, and evaluate instream habitat and riparian restoration project activities and BMPs and monitor effectiveness in improving habitat for coho salmon	Monitoring is underway in limited areas, no comprehensive analysis.	Local groups DFG	Design and implement comprehensive assessment and monitoring incorporating protocols developed in statewide or regional monitoring programs Make sure effectiveness monitoring is a component of future habitat improvement projects.	Continue implementation and incorporate into future management plans or actions	HM-1-1b, HM-1-1c, HM-2e
MA-9	Tier 4	Long-term	Inventory, evaluate, and monitor changes in land use practices over time including conversion from agriculture to other uses for impacts on coho salmon and their habitat.	No formal analysis underway	Local groups County DWR	Collect baseline data	Evaluate and incorporate information into the County land use policy	HM-2e, HM-4a

Category: Monitoring and Assessment: Habitat (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cross References**
	Importance	**Timing**						
MA-10	Tier 2	Near-term	Conduct adult and juvenile current and potential carrying capacity estimates and monitor changes over time.	Some relevant data are being collected but no assessment has been done toward carrying capacity.	DFG/ NOAA Fisheries	Assess and estimate current and potential carrying capacity. Evaluate potential method for predicting carrying capacity.	Apply abundance data to determine realization of carrying capacity.	WM-3a, WM-3b, WM-5b, WM-5c, WUE-5a, HM-4b, HM-1c, HM-1a
MA-11	Tier 1	Near-term	Conduct Groundwater Monitoring in support of the studies referred to in WM-10a and WM-10b.	Ongoing	DWR	Support and expand coverage and frequency of current DWR and Local Group long-term monitoring. If ground water is used to supplement surface water for instream flows, monitor the effects on stream flows and well levels. Collect and distribute monitoring data from additional wells to establish ground water contours	Information to be provided to ground water committee referred to in WM-10c. Continue long-term monitoring.	WM-10a, WM-10b

Category: Monitoring and Assessment: Coho Populations (continued)

Issues: Baseline information is needed on the distribution and abundance of coho salmon within both watersheds. Monitoring coho populations over time is necessary to determine long-term trends in abundance, evaluate the effectiveness of coho recovery actions and progress toward meeting recovery goals, and provide data to guide changes in management actions. Availability of baseline information is affected by the difficulty, due to high winter flows, of counting adult salmon.

Solutions: Work with DFG and other fisheries experts to develop and implement a program to monitor coho abundance and distribution within the Shasta Valley and Scott River HSAs. Integrate this program with existing regional and statewide monitoring efforts.

ID	Priority		Recommendation	Status	Lead	Short-term Action	Long-Term Action	Cross References
	Importance	Timing						
MA-12	Tier 1	On-going	Conduct limiting factors analysis and monitor changes through time by life stage for coho salmon.	Ongoing in Scott Draft (limited by available data) under review for Shasta	DFG NOAA Fisheries SRWC CRMP	Identify additional data needs to complete both efforts. Assess disease as a limiting factor.	Develop management plans for remediation of limiting factors. Monitor effects to coho populations and habitat.	
MA-13	Tier 1	on-going	Continue to identify the historic and current distributions of coho salmon adults and juveniles within the Scott River and Shasta Valley HSAs.	Limited surveys are currently underway in Scott to identify distribution of adult and juvenile coho salmon No surveys currently underway in Shasta	DFG/ Local groups NOAA Fisheries (permits)	Identify, evaluate, and map coho spawning and rearing habitat utilization areas and monitor changes through time.	Monitor and analyze spatial structure and changes in distribution through time. Continue to implement and use results to modify monitoring protocols, and modify restoration techniques	WM-3a, WM-3b, WM-4a, WM-4b, WM-5b, WM-5c, WUE-5a, HM-1-1a, HM-4a, HM-4b, HM-1a, HM-1b, HM-1c, P-1, P-5, P-6

Category: Monitoring and Assessment: Coho Populations (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cross References**
	Importance	**Timing**						
MA-14	Tier 1	Near-term	Conduct adult and juvenile abundance estimates and monitor changes over time.	Adults and outmigrants counted at mouth of Shasta. Outmigrant trapping and limited spawner surveys, on Scott Count data not precise, particularly for Scott	DFG/ NOAA Fisheries	Begin abundance surveys. Develop and implement statistical methodology for adult and juvenile salmon. Improve methods for counting adult salmon in Scott.	Continue and improve abundance surveys. Use data to develop annual adult and outmigrant abundance estimates for both Valleys.	WM-3a, WM-3b, WM-5b, WM-5c, WUE-5a, HM-4b, HM-1c
MA-15	Tier 3	Medium	Conduct analysis of juvenile growth rates and production estimates and monitor changes through time.	Limited data being collected at outmigrant traps.	DFG/ NOAA Fisheries	Develop and implement a comprehensive study plan with appropriate agencies	Continue studies and apply results as appropriate.	WM-3a, WM-3b, WM-5b, WM-5c, WUE-5a, HM-1c
MA-16	Tier 4	On-going	Conduct standard measurements of trapped spawners and carcasses	Currently underway	DFG Local Groups	Develop egg production estimates and spawner age distribution	Apply data via appropriate agencies	

Category: Monitoring and Assessment: Coho Populations (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cross References**
	Importance	**Timing**						
MA-17	Tier 4	Long-term	Identify adult and juvenile diversity (genotypic/phenotypic) variations within the Scott and Shasta rivers for comparisons with other populations within the Southern Oregon-Northern California ESU.	Genetic study has begun by various state and federal agencies	DFG/ NOAA Fisheries	Coordinate with state and federal agencies in collection of tissues	Make both phenotypic and genotypic data available to appropriate agencies and public	
MA-18	Tier 4	Long-term	Food availability: conduct macro-invertebrate assessments and monitor changes through time.	Limited data collected in both Valleys	DFG Local groups DWR	Expand studies and analyze results.	Apply results as appropriate.	

Category: Monitoring and Assessment: Coho Populations (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-Term Action**	**Cross References**
	Importance	**Timing**						
MA-19	Tier 1	On-going	Assess effectiveness of fish rescue program through monitoring survival of rescued fish	DFG currently evaluating the rescue program.	DFG	Support DFG effort to monitor and assess the survival of the rescued fish.	Provide assistance in monitoring fish survival.	P-4

Coordination with other Monitoring Programs

Department of Fish and Game (CDFG)/NOAA Fisheries:

1. Restoration Effectiveness Monitoring and Protocol Development Project
2. Restoration Validation Monitoring and Protocol Development Project
3. California Coastal Salmonid Monitoring Plan
4. Steelhead Research and Monitoring Program (SRAMP)
5. State (CESA)/Federal (ESA) Recovery Planning

Other State Agencies:

1. Department of Water Resources (DWR)
2. North Coast Regional Water Quality Control Board (NCRWQCB)
3. —TMDL (sediment, temperature, nutrients)

Other Federal Agencies:

1. Aquatic Resource and Ecological Monitoring Program (AREMP)
2. Natural Resources Conservation Service (NRCS)
3. Environmental Protection Agency (EPA)

Local/Regional Entities:

1. Resource Conservation Districts
2. Watershed Councils
3. CRMPs
4. Five Counties Salmonid Conservation and Road Program

Academic Institutions:

1. University of California Cooperative Extension
2. Humboldt State University
3. UC Berkeley/Davis

Shasta-Scott Recovery Team Recommendations for Recovery of Coho Salmon

7. Education and Outreach

Area: Klamath River Hydrologic Unit: **Scott River Hydrologic Area (HA) and Shasta Valley Hydrologic Subarea (HSA)**								
Category: Education and Outreach								
Issues: 1) Coho salmon recovery cannot succeed without buy-in from local people. Education and outreach can help landowners and members of the public understand why restoring coho salmon and their habitat is worthwhile, and how they can help. **2)** To improve funding opportunities for restoration, education must also be targeted towards agency and elected officials at the state and national levels, to inform them about local efforts and successes in the Shasta and Scott Valleys.								
Solutions: Use events, workshops, and various forms of media to encourage changes in attitudes and behavior that enhance coho salmon recovery.								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO-1	Tier 3	Near-term	Use existing extension services to inform landowners of funding programs for water conservation, fish habitat restoration, and Best Management Practices (BMPs).	Funding is currently available for fish-friendly projects within the Klamath Basin.	NRCS, UC Extension Services, USFWS, DFG	Advertise available funding sources, assist landowners in identifying projects for support (based on SWRT recommen-dations), provide grant writing resources/ training. Monitor extension effectiveness (# projects funded, # projects implemented) on a routine basis.	Expand extension efforts to include all interested landowners. Insure that all priority projects are funded. Continue to monitor extension effectiveness.	Short-term: $20,000/year Long-term:

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO- 2	Tier 3	Near-term	Sponsor land stewardship training courses (e.g., ranch planning, road maintenance, alternative stock watering system development and maintenance, irrigation ditch maintenance, and water use efficiency, prioritizing activities that tangibly increase instream flows and improve water quality).	Successful land stewardship courses from other regions can be adapted to the Shasta and Scott.	Watershed Councils and CRMPs, RCDs, UC Ext. Services, NRCS	Implement local-adapted land stewardship courses.	Expand locally adapted land stewardship courses and monitor their effectiveness.	Short-term: $ 50,000 Long-term:

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO-3	Tier 4	Medium	Fund demonstration projects on land with public access, showing fish-friendly BMPs and associated agricultural innovations.	Successful projects have been implemented on private land, but repeatedly showing these to the public places a burden on landowners.	Watershed Councils and CRMPs, RCDs, NRCS, USFWS	Identify locations for demon-stration projects. Undertake integrated restoration efforts at these sites. Organize tours to visit these demonstration projects. Organize tours of successful demonstration projects in other watersheds, to gain inspiration.	Continue to improve demonstration projects, while developing an active research program to assess demonstration project effectiveness.	Short-term: $ 75,000 Long-term:
EO-4	Tier 2	Near-term	Use available outreach resources to inform landowners about existing riparian easement or lease programs and how to participate in them.	Many landowners are already participating in NRCS' RR/CRP Program.	NRCS. Watershed Councils and CRMPs, RCDs	Contact landowners and help them identify how riparian easements can assist them in achieving land management objectives. Identify funding sources to help compensate landowners for establishing and maintaining riparian easements.	Expand outreach efforts throughout the Shasta and Scott Valleys.	Short-term: $ 3,000 Long-term:

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO-5	Tier 4	Medium	Enhance funding for school systems to continue and expand watershed and fisheries education (examples of activities already done in Siskiyou County: aquarium incubators in classrooms; a riparian plant nursery; student participation in spawning survey data gathering).	If supported, experienced staff in public schools and local agencies can expand their programs.	Schools, Tribes, DFG, Watershed Councils and CRMPs. RCDs	Increase participation in current programs, and expand them to other agencies and communities. Evaluate program effectiveness and revise as necessary.	Review overall effectiveness of on-going programs and revise as necessary. Create new watershed and fisheries education programs.	Short-term: $75,000/ year Long-term:
EO-6	Tier 4	Near-term	Develop and distribute widely an informational brochure explaining coho salmon life history, habitat requirements, and both its historic and recent distribution.	Use information in the Shasta and Scott Watershed Summaries in developing this brochure.	DFG, private graphics consultant	Develop this brochure and print 10,000 copies.	Revise and reprint the brochure as needed.	Short-term: $10,000 Long-term:

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO-7	Tier 4	Near-term	Develop and distribute widely a newsletter describing current fisheries restoration efforts, as well as how the public can become involved.	Build on previously published Watershed Council and CRMP newsletters.	RCDs, Watershed Councils and CRMPs, County Government, USFWS, DFG	Publish a newsletter (15,000 copies) that is inserted into local newspapers once every six months, beginning in late summer/fall 2003.	Continue to publish a newsletter at least once a year.	Short-term: $ 20,000/yearLong-term: $ 15,000/year
EO-8	Tier 4	Medium	Develop and distribute an informational brochure describing plant species recommended for riparian restoration, emphasizing the use of native plant species and matching species to specific streambank conditions. Causes of past riparian planting failures and remedies to these will be discussed.	Local riparian restoration programs have gained extensive knowledge in riparian plant propagation, appropriate restoration site selection, outplanting techniques, and plant protection.	County Government, Watershed Councils, CRMPs, DFG	Consult past and continuing local riparian restoration programs to gather information about riparian species nursery management, restoration site selection, outplanting, and plant protection. Use this information to develop the brochure.	Monitor riparian restoration project effectiveness (e.g., plant survival, increased cover, lowered water temperatures, improved bank stabilization, and then revise and reprint the brochure as needed.	Short-term: $ 3,500/year Long-term:

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO-9	Tier 4	Near-term	Develop and distribute a publication targeting non-agricultural landowners that highlights the importance of not removing riparian vegetation, and the beneficial role of large woody debris in properly functioning streams.	Build on previously published stream condition inventory reports (e.g., USDA-FS) and Watershed Council / CRMP newsletters.	RCDs, Watershed Councils and CRMPs, County Government	Publish an annual newsletter (1,000 copies) and distribute via local, state and Federal agencies. Offer incentives to participate in riparian protection / enhancement programs (free workshops on riparian restoration, free riparian species seedlings, etc.). Provide recognition and awards to exemplary non-agricultural land-owners, highlighting their riparian protection/restoration efforts. Coordinate with the Yreka Creek Committee in designing complementary riparian protection programs.	Continue to publish a newsletter at least once a year. Expand initiatives that enhance protection and recovery of riparian areas, especially where beneficial to coho salmon.	Short-term: $ 2,500/year Long-term: $ 5,000/year
EO-10	Tier 4	Long-term	Based on a literature review of beaver-salmon interactions, publish a brochure to educate the public about the impacts of beavers and their dams on coho salmon and coho salmon recovery.	Historical evidence, documenting the abundance of beavers and their impact on riparian landscapes, can be collected and cited.	DFG	Review beaver-salmon interaction literature to provide a basis for brochure content.	Revise and republish brochure as necessary.	Short-term: $ 1,000 Long-term:

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO-11	Tier 4	Near-term	Produce a locally oriented fish-friendly road and stream care handbook for free distribution.	No such handbook currently exists.	Watershed Councils and CRMPs,-tribes, County Government, CDFG	Develop this handbook and print 1,000.	Update every two years, or as needed.	Short-term: $ 25,000 Long-term: $ 7,500 every two years.
EO-12	Tier 3	Near-term	Produce a brochure targeted at prospective landowners, real estate agents, and title companies that describes adjudicated water rights, irrigation ditch easements, and the requirements/responsibilities associated with them. The brochure should emphasize that access to ditches with easements must be granted to allow for ditch maintenance and repair.	No such information can currently be made quickly and easily available to prospective landowners, real estate agents, and title companies.	DWR County Government	Develop this brochure and print 200 copies.	None	$500
EO-13	Tier 4	Near-term	Recruit local media and media personalities to inform the public about restoration efforts. Develop and submit Opinion-Editorial pieces related to local coho salmon restoration efforts/issues.	Local media (e.g., radio, newspapers, cable TV) are currently under-utilized outreach resources.	RCDs, Watershed Councils and CRMPs, Schools, County Government, Tribes, DFG	Interview local people spearheading fish restoration efforts for radio, newspapers, and cable TV. Do this quarterly.	Continue to produce interviews and reports for local radio, newspapers, and cable TV every three months.	Short-term: $ 5,000 Long-term:

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO-14	Tier 4	Medium	Use media professionals to create informational videos that are local in context, to be shown to schools, service clubs, county fair-goers, etc.	There is currently no professionally produced locally oriented video that can be used for public outreach.	DFG, Tribes, FWS, RCDs, Watershed Councils and CRMPs	Shoot informational video during 2003-2004 (during all four seasons). Edit video during latter portion of 2004. Begin using video in early 2005.	N/A	Short-term: $ 25,000
EO-15	Tier 4	Near-term	Establish a web site with coho salmon biology information, up-to-date restoration grant funding, and examples of projects. Ask local websites to provide a link to this coho salmon site.	There is currently no such website.	DFG (server and connection), private computer graphics consultant	Create website and make operational by the end of 2003. Provide for monthly website maintenance and updates.	Continue to maintain and update website monthly.	Short-term: $ 5,000 Long-term: $1,000/ year
EO-16	Tier 4	Medium	Develop an informational PowerPoint presentation on coho recovery and provide this to local groups (service organizations, county fair, local extension offices, etc.)	There is currently no such presentation.	DFG, Watershed Councils and CRMPs, RCDs, and other agencies to provide review.	Develop PowerPoint presentation, send to other agencies/groups for review, then revise and distribute.	Update every two years, or as needed.	Short-term: $ 1,000 Long-term: $ 1,000 every two years.

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Import-ance	**Timing**						
EO-17	Tier 3	Near-term	Establish contacts and organize events that bring resource-dependent people from throughout the Klamath Basin together, and that foster communication, friendship, and cooperation.	Events should be regular enough to sustain working relationships basin wide.	DFG, USFWS, NOAA Fisheries, Tribes, and the public	Organize an event/gathering that people throughout the Klamath Basin might want to attend (SSRT brainstorming needed).	Continue to organize basin wide gatherings regularly, and publicize these gatherings widely.	Short-term: $10,000/year Long-term: $7,500/year.
EO-18	Tier 4	On-going	Organize an annual (coho) salmon festival, inviting the general public. Put on a mini version of this festival at the county fair, to help advertise the event.	This was done in 1999 on a modest scale in the Scott Valley. The Watershed Council, tribal members, and several agencies participated. Weaverville also has a fall salmon festival.	Watershed Councils and CRMPs, RCDs, County Government, Tribes, and all agencies	Select an optimal season (fall?) and date, and organize a salmon festival at this time every year.	Continue to organize annual salmon festivals.	Short-term: $5,000/year Long-term:
EO-19	Tier 4	Near-term	Provide the public with information about the California Irrigation Management Information System (CIMIS)	DWR has some CIMIS informational material that can serve as a starting point.	DWR	Produce CIMIS informational materials for circulation through a variety of media.	Update CIMIS informational materials every two years and re-circulate.	Short-term: $1,000/year Long-term:$1,000 every two years

Category: Education and Outreach (continued)								
ID	**Priority**		**Recommendation**	**Status**	**Lead**	**Short-term Action**	**Long-term Action**	**Cost**
	Importance	**Timing**						
EO-20	Tier 3	Near-term	For each of the Shasta and Scott watersheds, organize a quarterly forum for exchange of information between parties collecting data, conducting research, and implementing restoration projects on the ground. These meetings will be open to the public.	The SRWC sponsored the first quarterly forum in April 2003.	Watershed Councils and CRMPs, RCDs.	Organize meetings in the Shasta and Scott Watersheds quarterly.	Continue to organize quarterly meetings.	Short-term: $ 800/year Long-term: $ 800/year
EO-21	Tier 3	Near-term	Produce quarterly Congressional Briefings (state and Federal).	Such briefings have not been produced to date.	County, DFG, USFWS, Watershed Councils and CRMPs, RCDs	Each briefing should summarize recent fish run trends, projects funded/ completed, projects recently applied for, upcoming project applications, and pressing issues.	Continue to submit quarterly Congressional Briefings.	Short-term: $1,000/year Long-term:
EO-22	Tier 3	Med.-term	Conduct tours for media, legislators State and Federal), schools, public, and others to show coho salmon and habitat recovery efforts.	Such tours have occurred only irregularly, and prior notice to the public has been limited.	DFG, Watershed Councils and CRMPs, RCDs, Tribes, County Government	Organize tours during summer, late fall (during coho salmon run), and spring.	Continue to organize tours, as necessary.	Short-term: $1,000/year Long-term:

V. IMPLEMENTATION

A. Introduction

Acceptance of the Shasta-Scott Pilot Program by local ranchers and farmers is inextricably linked to development of a programmatic implementation framework which covers normal ranching and farming activities consistent with the Pilot Program. This framework would include necessary Streambed Alteration Agreements for water diversion and other instream work including coverage for any unavoidable incidental take of coho salmon or other listed species. Every effort must also be made to coordinate other State and Federal permit requirements for regulatory compliance and thereby provide regulatory certainty for local ranchers and farmers. The Department and NOAA Fisheries should initiate this coordination at the senior management policy level as soon as possible.

In addition to many proactive resource management changes designed to immediately benefit coho salmon, the plan includes a prioritized list of recommendations including extensive baseline study and thorough monitoring designed to lay the foundation for adaptive management of resources for sustained coho recovery. Restoration efforts in the Shasta and Scott watershed over the course of the past 10-15 years, coupled with the Pilot Program are all aimed at minimizing and reversing potential adverse impacts. Collectively, the team believes the measures would be sufficient to warrant the issuance of an initial five year Incidental Take Permit provided that a large percentage of ranchers and farmers participate in the Pilot Program. We recognize that some measures of the plan may need further specificity before it is sufficient to be used as the basis for permit conditions and eligibility. However, members of the team are developing specific criteria based on critical elements of our restoration and recovery plan that would help to meet the requirements of the initial five year Incidental Take Permit.

B. State Permitting Options

State law generally provides for the following options with regards to permitting incidental take of listed species covered by an approved Recovery Strategy:

1. Cover Incidental Take in the Recovery Strategy.

   Fish and Game Code (FGC) Sections 2110, 2112 and 2114 outline a process by which policies to guide incidental take of covered species are included in the Recovery Strategy. Upon approval of the Recovery Strategy, these policies and guidelines must be promulgated as regulations pursuant to the State rule making process including compliance with CEQA. Depending on the nature of the adopted regulations, specific Incidental Take Permits may or may not be required. Programmatic or individual Streambed Alteration Agreements would still be necessary for water diversions and other instream activities including CEQA compliance.

2. Programmatic Streambed Alternation Agreement with Incidental Take Permit.

   Pursuant to FGC Section 1603, a programmatic Streambed Alteration Agreement could be negotiated with Siskiyou County or the local Resource Conservation Districts to cover agricultural diversion and other instream activities consistent with the Pilot Program. Potential incidental take of coho salmon or other listed

species (e.g. willow flycatcher, bank swallow) would be covered by an Incidental Take Permit issued pursuant to FGC Section 2081(b). Compliance with the California Environmental Quality Act (CEQA) would be necessary.

3. Individual Streambed Alteration Agreements with Incidental Take Permits.

   In contrast to negotiating a programmatic Streambed Alteration Agreement as outlined in Option 2 above, each individual rancher or farmer would be required to negotiate an individual Streambed Alteration Agreement for water diversions and instream activities. An Incidental Take Permit would also be required for each Streambed Alteration Agreement that may result in the incidental take of coho salmon (or other listed species) and compliance with CEQA would be required.

4. Consistency Determination with Federal Incidental Take Permit or Statement.

   FGC Section 2080.1 provides that no further authorization or approval is needed for the incidental take of a species dually listed by the Federal and State governments if a person has obtained an Incidental Take Permit or Incidental Take Statement from the Secretary of the Interior or the Secretary of Commerce. However, the Director of the Department must determine whether the Federal permit or statement is consistent with all requirements of the California Endangered Species Act including the requirement to fully mitigate any proposed taking. A Streambed Alteration Agreement would still be required for water diversions and other instream activities and compliance with the CEQA would also be required.

C. Selecting a Permitting Option

Based on preliminary discussions with Department Legal Staff on June 17, 2003, the SSRT is currently pursuing a programmatic Streambed Alteration Agreement and Incidental Take Permit for coho salmon and other listed species (Permitting Option 2). As the lead agency under the California Environmental Quality Act, the Department will be responsible for preparing any required environmental document.

Options 1 and 4 are favored as pragmatic approaches by the SSRT. However these two options have a number of procedural uncertainties and Option 4 is dependent on completion of Federal processes that have not been initiated. Option 3 is not viable because the SSRT desires a more efficient solution to permitting requirements.

Because of the uncertainty regarding many specific needs of coho salmon in both watersheds, the lack of specific information about some proposed mitigation measures and potential risk to local communities as well as fish and wildlife from hasty and potentially ill-conceived recovery efforts, the SSRT is proposing that an initial five-year incidental take permit be developed prior to 2004. During that five year period, the main focus will be to: 1) assure that no further loss of coho habitat occurs; 2) maintain current coho presence; 3) improve instream and riparian habitat conditions for coho; and 4) provide adequate time and opportunity for the development of the details of additional mitigation measures, performance of necessary studies, collection of data, and interpretation of monitoring results to allow the development of comprehensive long-term recovery measures. Both the continuance of this proposed permit and the issuance of future

Incidental Take Permits are expected to be conditional on making adequate progress towards the performance of necessary coho recovery steps. For the purposes of this first permit, due consideration will be given to the incremental improvements achieved from the steps already taken by many individuals throughout the watershed to minimize and mitigate adverse impacts on coho and other cold water fish.

To this end, the SSRT has initiated informal consultation with the Department on the Incidental Take Permit with a draft Incidental Take Permit application submitted on June 24, 2003 for review and comment. Activities to be covered under the permit will include all normal ranching and farming activities consistent with the SSRT Pilot Program for the Scott and Shasta valleys.

The SSRT currently envisions that the Siskiyou Resource Conservation District (RCD) and the Shasta Valley RCD will hold separate programmatic Streambed Alteration Agreements and Incidental Take Permits for the ranching and agricultural areas of Scott and Shasta valleys, respectively. It is also anticipated that the initial Incidental Take Permits will run concurrently for five years with the Streambed Alteration Agreements but that future permits may run for a longer term coincident with the automatic renewal provision for Streambed Alteration Agreements pursuant to FGC Section 1603(g). Ranchers and farmers who choose not to participate in the programmatic Streambed Alteration Agreement will be responsible for negotiating individual Agreements and Incidental Take Permits with the Department.

Basic administration of the programmatic Streambed Alteration Agreement, including recruitment of individual ranchers and farmers, will be the responsibility of the respective RCDs. Enforcement will occur in a staged manner with the Districts monitoring activities of participants to verify compliance. The Department will take action against noncompliant participants as deemed necessary and in consultation with the RCDs.

The SSRT remains very concerned that acquisition of a programmatic Streambed Alternation Agreement and associated Incidental Take Permit from the Department will fail to resolve all regulatory compliance issues because of the ongoing disconnect between State and Federal permitting processes. The SSRT is aware of the other options for obtaining Federal Take Authorization including Section 4(d), Section 7, and Section 10 of the Federal Endangered Species Act. The SSRT strongly urges State and Federal agencies to unify these efforts promptly.

The SSRT notes that in 1997 the National Marine Fisheries Service (NMFS) promulgated an interim rule pursuant to Section 4(d) of the Endangered Species Act for coho salmon in the Southern Oregon/Northern California Coast Evolutionarily Significant Unit (SONCC ESU) (Federal Register, Vol. 62, No 138, Friday, July 18, 1997, pages 38480-85). The SONCC ESU includes the Shasta River and Scott River watersheds.

Through this interim Section 4(d) rule, NMFS has determined that it is unnecessary to prohibit specific benign and beneficial actions carried out by State, tribal and local governments in the California portion of the coho SONCC including certain State, local, tribal and private habitat restoration activities as long as there is a watershed conservation plan that identifies limiting factors and that restoration actions follow the criteria contained in the California Salmonid Stream Habitat Restoration Manual. Further, the interim 4(d) rule provides specific exceptions for local habitat restoration and watershed planning efforts expected to contribute to the conservation of coho salmon in the Scott and Shasta River watersheds. The SSRT suggests that restoration actions consistent with California Salmonid Stream Habitat Restoration Manual that are proposed by the Shasta-Scott Pilot Program Plan will meet this requirement.

D. Utility of SSRT Recommendations for Implementation and Permitting

The SSRT believes that the measures and the recommendations developed provide a reasonable balance between public and private costs, provide reasonable assurances that necessary short term recovery measures are taken, and adequate scientific basis is created with which to formulate longer term steps that will need to be taken. However, the availability of public funds for specific application to the measures of the plan will be integral to the plan's success.

Restoration and protection measures identified in the SSRT recommendations can only improve conditions for coho salmon in the Shasta and Scott rivers if participation in the coho recovery is widespread. In order to ensure widespread participation in the recovery strategy, regulatory standardization and streamlined permitting, which would provide protections to those who choose to participate, would provide a strong incentive for landowners to adopt recovery measures.

Recommendations contained in this report have been prioritized into "Tiers" based on their importance for coho recovery and include a timing component (see Section IV. B., above). It is anticipated that the initial Incidental Take Permit(s) will incorporate many Tier 1 and Tier 2 recommendations which fall into the Near and Medium terms (1-5 years). Tier 1 recommendations are measures critical to coho recovery which must precede actions in other tiers or are essential to avoiding further habitat loss in the near-to mid term. Tier 2 recommendations are measures critical for coho recovery because recovery cannot happen without their implementation. This proactive approach will require a balanced mix of measures designed to protect and enhance existing coho habitat while laying the scientific basis for future recovery efforts.

It is also anticipated that selection and inclusion of appropriate Tier 1 and Tier 2 recommendations for the initial Incidental Take Permit will not only meet the "minimize and fully mitigate" criteria of FGC Section 2081(b)(2), but will maintain ranching and farming activities to the greatest extent possible consistent with the Shasta-Scott Pilot Program. It is also assumed that required mitigation will be roughly proportional to the impact of any incidental taking of coho salmon.

E. Adaptive Management: Coping with Data and Knowledge Gaps

The SSRT believes it is imperative to apply an "adaptive management" approach to local coho recovery efforts in the Shasta and Scott valleys. There is a wide range of data available for the Scott and Shasta watersheds, but there is a severe shortage of analyses that relate the different types of data. For example, while there is substantial data on flows and water quality, and increasing amounts of data on habitat condition, there are few, if any, relationships that have been developed tying these factors to fish abundance, growth, survival and distribution. Knowledge of these relationships will be necessary to predict the benefit to fish of changes in management practices.

Decline in coho populations necessitates management intervention, but there are many uncertainties involved in the response of the ecosystem to management practices. The adaptive environmental assessment (AEA) process can be used to develop an experimental management plan which takes these uncertainties into account (Walters 1986). The AEA process involves a series of workshops which bring together people with a wide variety of experience and expertise relevant to the problem at hand (Figure 6). The theoretical and technical information they contribute is used to identify a range of possible management actions, and to screen possible outcomes of different actions using computer simulation models. A management option that

appears most likely to succeed can then be chosen and tested in the field. Monitoring and re-assessment of the field experiment is essential so policy can be changed and improved as new information becomes available. This "adaptive management" approach allows managers and scientists to 'learn as they go.' It allows a reasoned response despite limited baseline data, and improves future management decisions by gathering more data as the experiment progresses. Ideally, the experiment is designed to increase the range of data available for future management decisions.

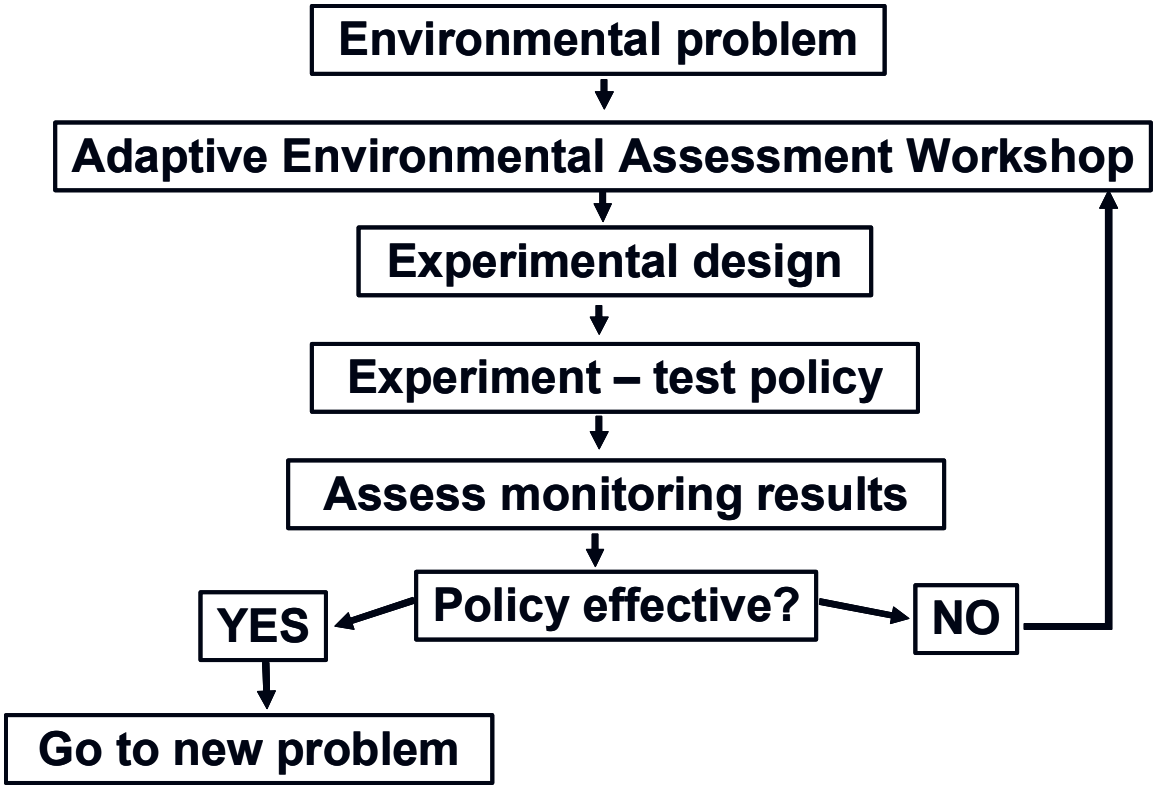

Figure 6. Adaptive management flow diagram.

Lack of adequate baseline information on a variety of pertinent biological and physical parameters, and the mechanisms that relate these parameters to coho creates uncertainty regarding the potential value or effectiveness of many proposed mitigation measures. Local coho recovery must therefore be approached in a manner that balances the apparent need to quickly protect and restore coho habitat with the fundamental need to fill critical voids in baseline data. This balanced approach is necessary to prevent or minimize expenditures on unnecessary measures and to assure mitigation actions can be evaluated quantitatively. In a perfect world, all biological and physical parameters associated with coho salmon recovery would be fully assessed to verify cause and effect relationships and to assure that all actions are based on valid conclusions.

Recommendations in the Shasta-Scott Pilot Program have been developed and prioritized so that management of coho recovery can proceed adaptively with a balance between immediate needs to protect and restore with the need to establish baseline condition. Feedback is addressed through a comprehensive monitoring plan with specific benchmarks for evaluating success.

F. Implementation Schedule

Restoration of habitats essential to coho salmon has been ongoing for 15 years in the Scott and Shasta watersheds. Various interest groups continue to implement a variety of measures designed to promote coho recovery as indicated in the recommendations contained above as "ongoing" actions. Short-term actions are the portions of recommendations that are proposed for completion within five years while long-term actions are portions of recommendations that are proposed for completion in five or more years.

Upon approval of a Recovery Strategy, FGC Section 2113 provides for continuing consultation between the Department and the SSRT on the status and progress of implementation of the Recovery Strategy. It is currently envisioned that the SSRT would continue to constitute a forum to solve problems with implementation, resolve conflicts, and discuss issues. To this end, the following tasks shall be undertaken:

- Advise the Department, provide coordination between agencies and permittees
- Identify funding sources
- Link funding sources to projects (further refine costs)
- Provide time line for all projects by category
- Combine category time lines into master implementation chart
- Participate in development/refinement of programmatic incidental take/streambed alteration permit process
- Participate in development of federal Incidental Take Permit and TMDL's
- Insure that lead agencies are following the established timelines
- Receive /review monitoring and assessment reports
- Determine cost/benefit ratio
- Develop criteria for establishment of objectivity in data gathering based upon science advisor input
- Review near term actions for effectiveness/incorporate results in future actions
- Develop adaptive actions based upon science advisor input
- Consult with the Department on annual report to the Fish and Game Commission
- Work with State and federal agencies with ESA and Clean Water Act authorities to coordinate and review changes in plans based on new information and results of studies.

G. Funding

The implementation schedule will remain dependent on funding. Implementation costs for some recommendations proposed by the SSRT have been categorized as high, moderate or modest. For many other SSRT recommendations, no attempt was made to estimate costs due to lack of information or uncertainties regarding project scope or timing. It is therefore not possible to make even a crude estimate of overall restoration costs at this time.

Historically, funding for salmon restoration has been available from a variety of sources including State and Federal agencies and from various restoration grant opportunities with cost sharing by local landowners. The current economic downturn and State budget crisis could jeopardize funding from one or more of these sources. The SSRT recognizes that obtaining adequate funding is essential to successful implementation of the Pilot Program.

The SSRT remains committed to working with the Department, other State and Federal agencies and with various interest groups to implement the Shasta-Scott Pilot Program in an economically reasonable manner with an equitable apportionment of public and private obligations. The SSRT continues to believe that an incentive-based approach to implementation is the most viable option for agricultural areas of the Shasta and Scott valleys.

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